

# HORTICULTURAL ABSTRACTS

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The necessity for economy in paper has forced us reluctantly to change the setting of *Horticultural Abstracts* to one which will ensure a saving of nearly 40 per cent. in paper. We should welcome comments from our readers, especially suggestions for increased clarity of setting which would not entail increased paper consumption.

The initialled book review in the present number is by D. W. Goodall of the East Malling Research Station.

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## MISCELLANEOUS.

### *Growth substances\* and propagation.*

338. RAPPAPORT, J. 577.15.04  
Comparative efficacy of growth substances in powder and solution form as regards the rooting of cuttings of different plants.  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1941, 32: 385T-96T, bibl. 38.

The paper described here was mainly carried out at the Division of Plant Physiology of the Botanical Institute, Ghent, Belgium. Results are compared of applying  $\beta$ -indoleacetic acid and other growth substances in solution and in powder form to a number of small ornamental plants, e.g. *Rosmarinus* sp., *Chrysanthemum indicum*, *Berberis thunbergii*, etc. The wet method was more successful than the dry. As regards the quantity of powder which should correspond with a given strength of solution the state of the base of the cutting is of considerable importance. The thicker, softer and more wrinkled the base, the greater the quantity of auxin powder which will adhere. Hence in such cases the proportion of growth substance in such a powder which is equivalent to the optimum concentration of an auxin solution will be less than for cuttings with a hard, thin, smooth base. In each particular case experiment is necessary. The dosages of  $\beta$ -indoleacetic acid in powder and in solution found by the author to have equal efficacy for 13 plants are tabulated.

339. SWARTZ, D. B. 577.15.04  
Effect of various growth-regulating substances upon several species of plants.  
*Bot. Gaz.*, 1941, 103: 366-73, bibl. 9.

The plants used were chrysanthemums, cosmos and marigold, the growth substances naphthaleneacetic acid, nicotinic acid, and nicotinic acid plus vitamin B<sub>1</sub>, the culture medium quartz sand and complete nutrient solution or nutrient

solution minus Mg, K or P. Response in chrysanthemums indicates the possibility that naphthaleneacetic acid may in some degree compensate for lack of K. On the whole the plants showed little response to the growth substances.

340. SWARTLEY, J. C. 577.15.04  
Effects of synthetic growth substances on transplants.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 357-60.

Treatment with various synthetic growth substances when transplanting stimulated root and stem development of such woody plants as honeysuckle, crab apple and juniper, of perennials such as coreopsis, viola and *incarvillea* and of the annuals tomato and aster. The direct application of growth substances in talc to roots of small trees resulted in the production of abnormal clusters of branch roots. Watering of grafted stock of red cedar in particular with growth substance solutions led to lower mortality and quicker root development.

341. STOUTEMYER, V. T. 577.15.04  
A comparison of rooting induced by acid- and by amide-growth substances.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 253-8, bibl. 5.

Comparative tests were carried out on the cuttings of a number of ornamental shrubs with acids and amides of various growth substances, the rooting and/or damage caused being noted in each case. The data obtained show the existence of certain fundamental, physiological differences between different groups of plants for which at present there is no satisfactory explanation. It is clear, at least, that the free acids, esters or potassium salts of growth substances cannot be regarded as the most satisfactory substances for cuttings of all plants and the supplementary use of other forms such as the amides must be considered.

\* See also 376, 394-397, 615, 716, 719.



342. FRIEDRICH, H. 577.15.04: 581.144.2  
Die Entwicklung des Wurzelsystems nach  
Wachstoffsbehandlung. (The effect of growth  
substances on rooting.)  
*Gartenbauwiss.*, 1940, 15: 396-8.  
Seeds of potato, tomato, and radish were soaked for 20 hrs.  
in hormone solutions, dried without rinsing on filter paper  
and sown in garden soil. Potato tubers were similarly  
treated for 24 hrs. The results showed that root in com-  
parison with shoot development is increased by hormone  
treatment.
343. AMLONG, H. U., AND NAUNDORF, G. 633.63: 577.15.04  
Über den Einfluss der Naphthyllessigsäure auf  
Entwicklung und Ertrag der Zuckerrübe. (The  
effect of naphthyl acetate on growth and crop of  
sugar beet.)  
*Forschungsdienst*, 1941, 11: 549-53, bibl. 2.  
Sugar beet seed was treated 24 hours before sowing with  
solutions of  $\alpha$ -naphthylacetic acid salt of potassium at  
0.002%, 0.010%, 0.020% and 0.100% strengths at  
four different places in Pomerania. The best results were  
obtained in each case irrespective of soil consistency, sand  
or loam, by the 0.010% solution. Treatment with solution  
of this strength led in every case to an increased sugar  
content in the roots and to increased crops. The dis-  
advantages are that to obtain these results the seed has to be  
soaked the full 24 hours, that at the end of soaking it has  
to be used at once or thrown away and that in its soaked  
state it does not readily pass through the drill.
344. PODESHVA, J. 577.15.04: 635.1/7: 631.531.17  
Ertragssteigerung an Gemüse durch Saatgut-  
Hormonisierung. (Seed treatment with growth  
substances results in increased crops.)  
*Dtsch. Landw. Pr.*, 1941, Vol. 68, Heft 9, pp. 73-4,  
from abstract *Forschungsdienst*, 1941, Vol. 11,  
abstr. p. 101.  
Very successful results are claimed for the use of heteroauxin  
solution on the seed of a large number of vegetables.  
Increased and earlier crops were obtained than with the  
controls. Neither the strengths used nor the precise  
chemicals are recorded in the abstract.
345. HAMNER, C. L. 577.15.04: 635.65 + 635.64  
Physiological and chemical responses of bean and  
tomato plants to  $\alpha$ -naphthalene acetamide and  
phenylacetic acid.  
*Bot. Gaz.*, 1941, 103: 374-85, bibl. 5.  
Records were made of the general appearance of bean and  
tomato plants, of their wet and dry weights and their  
content of total nitrogen, calcium and phosphorus when  
treated with  $\alpha$ -naphthalene acetamide and phenylacetic acid,  
applied either in nutrient solutions or as emulsion sprays  
to the tops of the plants. Results are discussed.
346. SMITH, P. F. 581.162.3  
Studies of the growth of pollen with respect to  
temperature, auxins, colchicine and vitamin B<sub>1</sub>.  
*Amer. J. Bot.*, 1942, 29: 56-66, bibl. 15.  
The experiments were carried out with pollen from a single  
flower in each case of *Antirrhinum majus* and *Bryophyllum*  
*daegremontianum*. The optimum temperature for germina-  
tion and growth of *Antirrhinum* (A) and *Bryophyllum* (B)  
pollen was 25° C. At 15° C. A pollen gave negligible  
growth, B pollen marked growth. At 35° C. both A and B  
pollens were injured or gave abnormal growth. The  
auxin moderately stimulated A and greatly stimulated the  
germination and growth of B pollens, the greatest stimulation  
occurring at 25° C. Three-indole-acetic and 3-indole-  
butyric were more effective than naphthalene acetic acid.  
Stronger concentrations than 1: 50,000 were toxic. Vitamin  
B<sub>1</sub> appeared to be ineffective. Colchicine depressed  
germination and tube elongation at all temperatures.
- Some interesting micro-photographs showing the results  
of the various treatments are provided.
347. MINNUM, E. C. 577.16: 635.15 + 635.35  
Effect of vitamins on growth of radish and cauliflow-  
er.  
*Bot. Gaz.*, 1941, 103: 397-400, bibl. 4.  
The addition of vitamins B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> to nutrient solution  
in concentrations higher than those normally used in previous  
tests had little if any effect on the growth of radish and  
cauliflower.
348. FISCHER, H. 635.655: 577.15.04  
Wachstumsförderung durch Sojaextrakt bei Baum-  
schulsaaten. (Soya bean extract promotes  
growth in nursery seed beds.)  
*Blumen u. Pflb.*, 1940, 44: 122-3, 158-9, from  
abstract *Forschungsdienst*, 1942, Vol. 11, abstr.  
p. 64.  
In trials at Pinneberg with deciduous and coniferous forest  
seed, both indoors and out, the treatment of the seed bed soil  
with soya extract some weeks before sowing resulted not  
only in better germination but also in much better growth  
of seedlings. The result is attributed to increased micro-  
biological activity of the soil. Soil analysis showed a great  
increase in azotobacter content as compared with untreated  
soil. Watering the seed with the extract just before sowing  
had no effect.
349. NIETHAMMER, A. 581.144: 577.15.04  
Erwecken ruhender Winterknospen durch Roh-  
wuchsstofflösungen von Pilzen. (Dormancy break-  
ing with fungous extracts.)  
*Gartenbauwiss.*, 1940, 14: 651-3.  
Cultures of yeast and *Penicillium* produce an abundance of  
growth-promoting substances. This solution was painted on  
the winter buds of lilac and the treatment furthered the  
development of the buds.
350. LAWRENCE, W. J. C. 631.531 + 631.532/5  
The John Innes composts.  
*J. roy. hort. Soc.*, 1942, 67: 86-91.  
An account of the John Innes composts which have been  
standardized to provide all that is necessary in the way of  
soil and fertilizer combination to grow plants and seedlings  
under glass. For further information see The John Innes  
Leaflet 1/2, 1941, 6d., obtainable from the Institution,  
31 Mostyn Road, London, S.W.19, or the author's book,  
*Seed and potting composts* (H.A., 11: 654 and 1508).
- 351<sup>f</sup>. FARRAR, J. L., AND GRACE, N. H. 634.975: 631.535  
Vegetative propagation of conifers. XI. Effects  
of type of cutting on the rooting of Norway spruce  
cuttings.  
*Canad. J. Res.*, 1942, Vol. 20, Sec. C, pp. 116-21,  
bibl. 14.  
Tests of type of cutting and rooting medium.  
MÄDE, A. 631.544: 631.436  
Über den Temperaturgang in Gewächshäusern,  
Dunkelkästen und Mistbeetanlagen. Ein  
Beitrag zum Mikroklima gärtnerischer Zuchtan-  
lagen. (Temperature conditions in glasshouses,  
frames and hot beds. The microclimate of the  
propagating bed.)  
*Gartenbauwiss.*, 1940, 14: 626-41.  
*Physiology.*
352. ROBERTS, R. H. 612.014.44  
Photoperiodism.  
*Chron. bot.*, 1941, 6: 437-8, bibl. 6.  
The role of photoperiod in the reproductive development of  
plants is much less exact than is sometimes represented.  
Response of plants to photoperiod is greatly modified by  
various factors, notably temperature, nutrition and, in



some cases, age. The conditions in which the parent plant has been grown may often modify the photoperiod response of their vegetative or even seed-produced progeny. In some combinations of environmental condition only a short photoperiod treatment will induce blossoming, in another environment the plant may not flower after even a prolonged photoperiod. Some plants placed after an induction treatment in an environment unfavourable to flowering will nevertheless flower in a short time and continue to do so while others will revert to a vegetative condition, although they may have reached a mature fruiting stage. The problem as seen by the author is "not what is the effect of photoperiod, for example, on blossoming, but are there conditions which are consistently related to blossoming?" Such conditions which may be used conveniently to induce it are an irregular  $CO_2$  exchange rhythm, altered growth rate, reduced root development, reduced cambial activity and phloem development. In addition to the study of external environment such as photoperiod studies are much needed on the photochemical reactions of plants and the effects of temperature on the chemistry of the plant.

353. GLOCK, W. S. 581.14: 551.56

**Growth rings and climate.**

*Bot. Rev.*, 1941, 7: 649-713, bibl. 203.

An impartial analysis of literature, chiefly from 1935 onwards, of recent work on the annual growth rings of trees as indicators of the past climatic conditions. The author sums up as follows:—The consensus of opinion among botanists, meteorologists, climatologists and others shapes itself rather definitely. Correlations, if legitimate, may corroborate suspected relationships but they neither reveal cause nor constitute a basis for interpretation beyond the samples participating in the calculations. It seems abundantly clear, first, that rainfall and temperature are of great importance to tree growth, second, that under a certain combination of interacting factors in certain localities rainfall and temperature have such an influence on physiological processes as to bring about a degree of similarity at times in the fluctuations of tree growth and rainfall or temperature, and third, that correlations, even if of high degree, do not permit the derivation of past or future rainfall. The derivation of climate from tree growth should be sought, apparently, by other means than by direct quantitative attempts to base amount of rainfall on width of growth layers, although at times this, in a measure, can be done.

354. BERGDOLT, E., AND SPANNER, L.

581.057; 581.14

Kritische Untersuchungen über eine lunare Beeinflussbarkeit von Pflanzenenerträgen. (A critical examination of the supposed influence of the moon on plant production.)

*Bodenk. Pflernähr.*, 1940, 20: 270-84, from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 95.

Experiments with radishes, cucumbers and tomatoes at the Munich Botanical Gardens in 1937 to 1939 show the absence of any positive or negative influence of the stars or moon on plant production.

355. EMERSON, R., AND LEWIS, C. M. 581.11/12

**Carbon dioxide exchange and the measurement of the quantum yield of photosynthesis.**

*Amer. J. Bot.*, 1941, 28: 789-804, bibl. 21.

Irregularities in the carbon dioxide exchange during short periods of light and darkness are shown to be a potential source of error in measurement of the quantum yield of photosynthesis by the method of Warburg and Negelein.\* Probable reasons for this and for the suggestion that oxygen exchange is a more reliable measure of the rate of photosynthesis over short intervals of time are discussed.

\* *Z. phys. Chem.*, 1923, pp. 191-218.

356. BEASLEY, E. W. 581.11: 632.943

**Effects of some chemically inert dusts upon the transpiration rates of yellow coleus plants.**

*Plant Physiol.*, 1942, 17: 101-8, bibl. 4.

Chemically inert dusts (Bancroft clay, fine and coarse talc and silica) deposited on the leaves of yellow coleus plants had no result except to increase night water loss and then only when the fine particle dusts were deposited on the under, stomata-bearing surfaces of the leaves. Dust applied on the upper surfaces or when the stomata were closed had no effect. Probably the action of the dust particles is to prevent complete closure of the stomata at night. It seems that dusts would have little effect on the transpiration rate of hardy plants in the field.

357. OEXEMANN, S. W. 631.531: 581.14

**Relation of seed weight to vegetative growth, differentiation, and yield in plants.**

*Amer. J. Bot.*, 1942, 29: 72-81, bibl. 18.

A positive correlation was observed between initial seed weight and number, size, dry weight and cross sectional dimensions of the various organs of soybeans, cucumber and tomato at the beginning of the flowering phase of the growth cycle. Plants grown from the heavier seeds showed early superiority over those from the lighter seeds. This had disappeared by about the 7th week. There was a relation between seed weight, and vascular bundle size but not vascular bundle number. There was a relation between seed weight and number and size of vessel-like elements. There is controversy in the literature as to whether the larger and heavier seeds produce higher yielding plants. The author found little difference in soybean and cucumber between yields from heavy or medium seeds. Any slight differences discovered were in seeds of the lightest class. The correlation between seed weight and order of ripening in tomato was too low to be significant. Except in tomato, plants from the lighter seeds showed somewhat heavier mortality than those from the heavier seed.

358. TIMONIN, M. I. 581.144.2: 632.3/4

**Microbial activity as influenced by root excretions.**

*Chron. bot.*, 1941, 6: 440, bibl. 4.

Flax (Bison) which is immune to *Fusarium* wilt was found to excrete small quantities of HCN into the soil surrounding the roots, whereby the growth of *Fusarium* was retarded. A non-immune flax (Novelty) excreted practically no HCN. Other soil micro-organisms reacted differently, e.g. the growth of *Trichoderma* was stimulated by the excretions from Bison.

**Erosion.\***

359. ENLOW, C. R. 631.459

**Measures and practices for controlling erosion and conserving water.**

*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1941, 32: 379T-84T.

A review of the work of the U.S. Soil Conservation Service. As an aid to the development of minimum requirements in respect of erosion practices 8 classes of land are distinguished to be treated in accordance with use capability. It is necessary to limit the classification to the problem in hand, preferably to the individual farm, otherwise recommendations become too general to be of use. A list of 36 measures and practices of value in conserving soil and water is given. These are not discussed, since the article is concerned with general principles to be considered when a conservation plan is being drawn up for an existing farm or for newly opened land. Emphasis is laid on the order in which the measures are to be carried out so as to interfere as little as possible with farm work.

\* See also 600-603.



360. FIELD OFFICERS, DIVISION OF PLANT INDUSTRY, N.S.W. 631.459  
 Soil erosion.  
*Agric. Gaz. N.S.W.*, 1941, 52: 506-22, 613; 1942, 53: 4-9, 20.

Under the general heading "Erosion control" officers of the N.S.W. Agricultural Department have contributed a series of useful and well illustrated articles dealing with the special problems of their districts.

361. WOODGATE, G. B. 631.459  
 Erosion control. Methods in use at Dookie Agricultural College.  
*J. Dep. Agric. Vict.*, 1942, 40: 5-15.

The methods of erosion control discussed in a well illustrated article are contour furrowing, contour banks and ridges and the treatment of gullies.

### General.

362. WHINNETT, S. 631.462  
 A home-made soil sterilizer.  
*Gdnrs' Chron.*, 1942, 111: 86-7.

Instructions are given for making a simple soil sterilizer. It consists of a small galvanized tank standing on two parallel brick courses 4 bricks high with firebars inserted between the 2nd and 3rd rows. Interior fittings are four wooden-sided trays of fine-meshed wire which stand one above the other in the tank and hold the soil. The bottom tray rests on a brick to raise it above the 2 inches of water in the tank. When in use the tank is covered by a sack over which a lid is fitted. The article is illustrated.

363. VAN METER, R. A. 634/635: 371.2/3  
 First courses in horticulture.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 446-8.

A brief survey of first courses in horticulture at the different State Colleges of the U.S.A. It may be noted that in replies to a questionnaire only 17 out of the 42 Colleges approached find their courses even fairly satisfactory. The courses as given are grouped under four headings thus:—1. *Principles of horticulture as they may be applied to the general farm.* States of Arizona, Iowa, Georgia, Maine, Nebraska, S. Dakota, Oregon and Washington. 2. *Orientation work of general background material on which later courses are built.* States of Ohio, Maryland, Rhode Island, N. Carolina, N. Dakota, Louisiana, Oklahoma, Michigan, Missouri, Idaho, New Hampshire and Kansas. 3. *Specialized work, usually in fruit or vegetables.* States of Minnesota, Vermont, Colorado, Delaware, Mississippi, Virginia, Kentucky, Montana, Illinois, S. Carolina, W. Virginia. 4. *Comprehensive work in propagation.* States of Pennsylvania, Massachusetts, Delaware, Indiana, Texas, Arkansas, Florida. It may be noted that Connecticut, Cornell, California, and Alabama do not have such courses.

364. ANON. 634/635(072)(43)  
 Die Versuchs- und Forschungsanstalten für Gartenbau. (Horticultural research institutes in Germany and Austria.)  
*Forschungsdienst*, 1941, 11: 148-9.

In order to make clear the functions of the different horticultural research and teaching institutes in the Reich the different institutes have been renamed. It is thought that these are worth noting for use after the war. They are as follows:—Versuchs- und Forschungsanstalt für Gartenbau und Höhere Gartenbauschule in Berlin-Dahlem; Versuchs- und Forschungsanstalt für Wein und Gartenbau und Höhere Wein und Gartenbauschule in Geisenheim; Versuchs- und Forschungsanstalt für Gartenbau und Höhere Gartenbauschule in Pillnitz; Versuchs- und Forschungsanstalt für Gartenbau und Höhere Gartenbauschule in Weihenstephan; Versuchs- und Forschungsanstalt für Wein- und Obstbau und Höhere Wein- und Obstbauschule in Klosterneuburg; Versuchs- und Forschungsanstalt für Gartenbau und

Höhere Gartenbauschule in Eisgrub. The general management is under the control of the Minister of Nutrition and Agriculture (Reichsminister für Ernährung u. Landwirtschaft). Appointments to the teaching staff are made on nomination by the Minister of Science and Education (Reichsminister für Wissenschaft, Erziehung und Volksbildung).

365. OGG, W. G. 631.82  
 The revival of liming.  
*Scott. J. Agric.*, 1942, 23: 355-66.

The questions discussed are: Does it pay to lime? When should lime be applied? Can the methods of application be improved? What forms of lime can be used? What quantity should be applied? Where can lime be obtained in Scotland? The author considers that despite the difficulties involved, a revival of liming in Scotland would be well worth while.

366. COPISAROW, M. 631.8  
 Natural and artificial fertilizers.  
*Chemistry and Industry*, 1942, 61: 67-8, bibl. 40.

The author discusses the problem of differentiating between natural and artificial fertilizing agents. The significance both to growth and propagation of the protective constituents of products of organic life cannot be exaggerated. The wide distribution of protective agents in the animal and plant world, their bactericidal, fungicidal and anti-virus properties, their transition in some cases into growth accelerators, e.g. maleic acid to ethylene, and their ultimate incorporation in the soil make them an essential factor influencing new growth. The characteristics of urea and humus are considered at some length. Lately a wide range of synthetic products has been evolved which seems to occupy an intermediate place among fertilizing agents. The persistence of growth promoters and even certain plant and animal cells for indefinite periods under conditions unfavourable to oxidation is noted.

367. STUCKEY, I. H. 612.014.44: 581.144.4  
 Some effects of photoperiod on leaf growth.  
*Amer. J. Bot.*, 1942, 29: 92-7, bibl. 15.

NEWCOMBE, H. B. 537.531: 576.312  
 The action of X-rays on the cell. I. The chromosome variable. II. The external variable.  
*J. Genet.*, 1942, 43: 145-71, bibl. 18; and 43: 237-48, bibl. 11.

HILL, R., AND LEHMANN, H. 581.192: 546.72: 581.174  
 Studies on iron in plants with special observations on the chlorophyll: iron ratio.  
*Biochem. J.*, 1941, 35: 1190-9, bibl. 12.

WATSON, J. A. S. 631.452: 631.417.2  
 Humus and soil fertility.  
*Scott. J. Agric.*, 1942, 23: 341-8.

PARSCHE, F. 631.586: 581.144.2 + 631.8  
 Wurzelraum- und Nährstoffkontrolle in Trocken- gebieten. (The determination of root distribution and of the availability of nutrients in dry districts.)  
*Forschungsdienst*, 1941, 12: 61-74, bibl. 49.

DIRKS, B. 631.413  
 Das Redoxpotential des Bodens, ein neuer Wachstumsfaktor von ausschlaggebender Bedeutung und zwei weitere Wachstumsfaktoren des Bodens. (Soil oxidation reduction potential, a new growth factor of decisive importance, and two further soil growth factors.)  
*Bodenk. PflErnähr.*, 1941, 21/22: 684-97, from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 75.

SOMMER, A. L., AND BAXTER, A. 632.19: 631.8  
 Differences in growth limitation of certain plants by magnesium and minor element deficiencies.  
*Plant Physiol.*, 1942, 17: 109-15, bibl. 2.



# TREE FRUITS, DECIDUOUS.

## General.

368. DAVIS, M. B. 634.11  
The Nova Scotia apple industry and future possibilities.  
*Seventy-seventh A.R. Nova Scotia Fruitgrs' Ass. for 1940, 1941*, pp. 107-10.  
BLIGH, R. D. L.  
Our apple industry—the present and future outlook.  
*Seventy-eighth A.R. Nova Scotia Fruitgrs' Ass. for 1941, 1942*, pp. 134-41.

Two clear accounts are given in the above papers of the present position facing the apple grower in Nova Scotia and of the necessity for increasing yield of high quality popular varieties by the elimination of orchards which cannot, even with the best treatment, produce adequate crops, and by the closest attention to all cultural and economic factors in production.

369. DATTA, R. M. 634.38  
The mulberry, I and II.  
Reprinted from the *Modern Review*, July, 1940 and February, 1941, pp. 7, bibl. 4.

Notes on the scientific aspects of mulberry culture in different parts of the world, including information on different types of mulberry grown.

370. DATTA, R. M. 634.38: 581.46  
On the hermaphrodite flowers of *Morus indica* Linn.  
*Science and Culture*, 1938, 4: 301.  
On the hermaphrodite flowers of *Morus indica* Linn.  
*Science and Culture*, 1939, 5: 373-5, bibl. 3.

## Varieties.

371. ZAETS, V. K. 634.11-2.111  
Frost resistance of Michurin's apple varieties.  
(Russian.)  
*Fruit and Vegetable Gardens*, 1941, No. 6, pp. 10-3.

The severe winter of 1939-40 showed *Malus prunifolia* Borkh. to be one of the most hardy species. Many Michurin varieties proved distinctly harder than the older varieties. Indications are given of the reaction of the different varieties.

372. SCHMIDT, M. 634.22-1.523  
Untersuchungen über den züchterischen Wert von Sämlingen der Kirschpflaume, *Prunus cerasifera* Ehrh. (The value of cherry plum seedlings for breeding.)  
*Gartenbauwiss.*, 1940, 15: 247-311.

Thirty-six seedlings of *P. cerasifera*, which originated from seeds brought back from Turkey by Professor Baur, were studied to determine their value as breeding-material. In their early stages the seedlings were briefly described by Rudloff, *Obst und Gemüsebau*, 1934, 80: 21-2. The seeds which came from various parts of Turkey and Anatolia were sown in 1927 and the present observations were made during 1939 and 1940. The plants showed very marked diversity. The morphological characters studied and described are:—habitus, leaves, flowers, fruit (including fruit shape and size, pedicel, colour of skin and flesh, bloom, thickness and firmness of skin and size and shape of stone). The taste and economic value of fruit and the yield are noted, as are also phenological observations on flowering time and duration and time of ripening. Details are given of pollination behaviour and crossing possibilities with other species and descriptions of selfed seedlings and hybrids. Only three seedlings were obtained in crosses with *P. domestica*. The most marked feature from the breeder's point of view is the fertility of these seedlings. They also thrive without special attention and are frost-resistant. The size of the trees makes harvesting easy and the capacity for regeneration is a valuable character. The seedlings are also resistant to the plum sawfly and, apart

from occasional attacks of *Monilia*, they are resistant to diseases. It is suggested that, by inter-crossing the varieties, certain improvements might be made, as the fruit has already a market, especially for jam-making. To incorporate some of the desirable characters with those of *P. domestica* presents difficulties on account of the differences in chromosome number.

373. BÖHM, J. 632.111: 634.7 + 634.11  
Russische Obstsorten im Böhmerwald. (Russian fruit varieties in Böhmerwald.)  
*Wiener landw. Ztg.*, 1940, Vol. 90, Heft 5, p. 28, from abstract *Forschungsdienst*, 1941, Vol. 12, abstr. p. 11.

An account of the successful growth at the foot of the Böhmerwald on the western borders of Czechoslovakia of various strains of small fruits obtained from Michurin. The apple varieties introduced from the same source come into blossom too early and so suffer from spring frosts.

## Propagation.

374. WHITTAKER, E. C. 631.541: 634.1/2  
The after-care of grafts.  
*Agric. Gaz. N.S.W.*, 1941, 52: 634-5.

With stump grafts the foliage should be left on the stump below the graft to help to keep the essential functions of the tree in being, and to guard the stumps against sun and wind. It should not be allowed to grow above the level of the scion and should be gradually eliminated over two seasons. Grafting ties should be cut a month after grafting. A special look-out should be kept for wood rots, particularly *Polystictus*. Scion growth should not be interfered with during the first season though unwanted shoots must be pinched out. Packham pears are an exception. With this variety, to prevent curling, the growing point of the main shoot is pinched out when the shoot is 10 inches long and again when a further 10 inches growth has been added. With very strong growths a further topping may be necessary in the second season. Trees furnished by frameworking are well provided with foliage from the numerous scions, and sucker shoots of the original variety can be removed when 5 inches long, enough being left to prevent sunscald of the limbs if it seems necessary. Any temporarily so left should be slightly pinched back.

375. WORLOCK, R. F. 631.541: 634.1/2  
El injerto sobre mesa. (Bench grafting.)  
*Rev. B.A.P.*, 1941, 24: 287: 29, 31, 33, 35.

A description of bench grafting (e.g. with apples) is given. Advantages mentioned are that failures after planting out only amount to 1% and that a whole year in growth is gained in the nursery. The usual time for the work is in spring and it is important that the temperature of the shed in which the work is done should not exceed 50° F. The grafts should be stratified in damp sawdust as soon as finished and kept there for at least 3 weeks before planting out. Simple whip grafting is the method advocated. This is illustrated and a recipe given for grafting wax (3 parts beeswax, 2 parts resin, 1 part boiled linseed oil).

376. PASSECKER, F. 634.1/2-1.535  
Die Bewurzelung von Obststecklingen. (The rooting of fruit tree cuttings.)  
*Gartenbauwiss.*, 1940, 15: 380-95.

The method used to obtain rooted cuttings is described. Young seedling plants were planted in pots and severely cut back. They were protected from frost and in January were brought into the warmth, preferably a greenhouse. There they developed shoots which, when 6-10 cm. long, were used as cuttings. Each cutting was 5-6 cm. long and from the longer shoots two cuttings could be obtained. The cut was made close under a leaf and the lowest leaf removed. The cuttings were placed in the propagating bed in the



greenhouse in a mixture of peat moss and sand or heath soil and sand. The cuttings should be firmly but not deeply planted. The conditions in the author's greenhouse made it necessary to cover each cutting with a tumbler or beaker. It was essential to prevent them wilting. In general very good results were obtained with apricots, peaches, plums, *Prunus fruticosa* and *Citrus trifoliata*, less good with apples, pears, cherries and American cultivated bilberries, while walnut cuttings callused only. Keeping the mother plants in an enclosed space favoured the production of roots, as cuttings taken from seedlings left in the open rarely rooted, but these, of course, were taken at a different time of year. In no case were roots obtained on the green cuttings of scion varieties, while only one rooted cutting was obtained from their woody cuttings. This was from a woody shoot of Canada Reinette treated with Belvitan solution. Treatment with growth hormones is not always advantageous and cuttings so treated may be more susceptible to fungous infection.

377. HILKENBÄUMER, F.

631.541.11: 634.1/7-1.535.6

Die Vermehrung von Obstunterlagen durch Wurzelstecklinge. (Propagation of fruit tree rootstocks from root cuttings.)

Forschungsdienst, 1940, 10: 553-66, bibl. 11.

An account is given of large-scale experiments by the Institute of Plant Production, Halle, on the propagation of rootstocks from root cuttings, the results being set out diagrammatically and discussed. 1. The percentage of plants obtained from root cuttings varied greatly in different fruits and in different seedlings of the same sort of fruit. The highest percentages of rooted cuttings were obtained by the apple rootstock types, followed by rootstocks of plum, plum seedling, apple and pear seedlings, bird cherry clones, sour cherry seedlings and quince types. There was a tendency in many of the seedling root cuttings to form shoot and root buds. 2. The top growth made varied greatly. Whereas in plum types, bird cherry, sour cherry and quince a large proportion were large enough to graft at the end of the first year, the young apple and pear plants, Malling IX excepted, were not ready till the end of a second year. 3. In general the amount of rooting was better in stone than in pome fruits. It was better in bird- and sour cherry than in plum, and in quince than in pear or apple. 4. Whereas the young growth in bird cherry formed numerous root buds, self-rooting in apple and quince was unsatisfactory and in the other rootstocks negligible. 5. Only in the bird cherry was it possible from every cutting to detach separate plants composed of the vigorous new shoots made and separate roots formed from these new shoots. 6. When taking root cuttings from different grafted trees it was possible to note a definite influence of variety on development of root cuttings. 7. Thicker pieces of root 5-15 mm. in diameter showed better growth in the propagation bed than thinner roots 3-5 mm. thick. 8. Dipping the cuttings in disinfectant, Uspulun or similar substance, did more harm than good. 9. The composition of medium, i.e. sand or sand and peat, had no definite effect on the degree of rooting. 10. It was found best to set the cuttings vertically and not on the slope. 11. Root formation was less under forcing conditions in the greenhouse at 20-25° C. than in warm propagating boxes 17-20° C. 12. The best shoot and root formation occurred in material set in such boxes.

378. DE HAAS, G.

634.11-1.541.11

Bietet "Eigenbewurzelung" Zukunftsaussichten? (Is there a future for growing fruit trees on their own roots?)

Dtsch. Obstb., 1941, Hft 3, pp. 45-7, from abstract Forschungsdienst, 1941, Vol. 12, abstr. p. 10.

Until research has disclosed exactly how each different variety of fruit tree will perform on its own roots, the

disadvantages of own rooted trees appear to be greater than the advantages.

379. GARNER, R. J.

634.11-1.541.44

Studies in framework grafting of mature fruit trees. IV. A comparison of frameworked and topworked apple trees.

J. Pomol., 1942, 19: 186-96, bibl. 6.

Newton Wonder apple trees, 13 years old, were reworked with Laxton's Superb, using three methods of topworking, namely oblique cleft grafting, rind grafting and rind grafting in which two whole branches of the Newton Wonder were retained for a season to facilitate recovery, and lastly frameworking by means of stub grafting. Although retention of the branches reduced loss by breakage and disease, which was particularly serious in the rind-grafted trees, it did not cause any significant increase in crop over rind-grafted trees in which all the branches were removed. Oblique cleft-grafted trees showed less loss from breakage and disease, made more new scion growth and cropped rather more heavily than rind-grafted trees. Frameworked trees lost no scions by breakage and suffered less from disease than topworked trees. Their new scion growth was greater than that in any of the topworked trees. They cropped heavily in the third season and continued to crop more heavily in subsequent years than trees topworked by any other method. Moreover, the first fruits borne by them were of better quality than those from topworked trees.

380. HILTON, R. J.

634.11-1.541.44

Studies in framework grafting of mature fruit trees.

II. Apples.

J. Pomol., 1942, 19: 149-67, bibl. 22.

An account is given of exact experiments at East Malling with Worcester Pearmain apples frameworked on Gladstone according to four methods. There was no significant difference in percentage take between any of the methods. Cleft grafting was carried out from February to June. The growth of the stub grafts was strikingly more vigorous than that of the side grafts throughout. The trees grafted in May were outstanding in their crops. Long scions resulted in heavier crops than short ones. Within the first three seasons the actual crops per tree ranged from 1 to 3 bushels. Bark grafting was possible only from April to June. On the whole the bark grafts were initially less vigorous than the cleft grafts. Of the two types the growth from inverted L grafts was more vigorous than that from awl grafts. The cropping of April and June bark grafts was similar to that of comparable cleft grafts, but that of the May bark grafts was not outstanding. On one and the same tree stub grafting resulted in more growth and more fruit buds than budding, which in its turn was superior to inverted L grafting. It was not possible to determine any effect on growth of the position of the scion on the frame in the season after grafting, but it appeared likely that apical dominance would eventually be re-established. In a minor experiment on fifteen 10-year-old frameworked trees it was found that the vigour of the Cox's Orange Pippin was not markedly different in the first four seasons after grafting, but differences in fruit bud formation and cropping on the different intermediates were more obvious.

381. HILTON, R. J., AND HOBLYN, T. N.

634.22-1.541.44

Studies in framework grafting of mature fruit trees. III. Plums.

J. Pomol., 1942, 19: 168-85, bibl. 7.

These experiments at East Malling show the practicability of frameworking plums but the necessity for greater care than in the case of apples. Thus large wounds must be avoided to prevent silver leaf infection and the scion wood must be in excellent condition, not dry, or poor takes will result. In one experiment cleft and bark grafting methods were compared, seven scion varieties being grafted on 14-year-old Czar trees. Cleft methods, i.e. stub and side



## TREE FRUITS, DECIDUOUS

grafts, proved better than bark grafts, i.e. inverted L and awl, though they lost rather more scions from silver leaf. Severe damage to scions in the first season from a summer gale indicated the desirability of summer pruning for vigorous varieties. There were large differences in the growth and cropping of the seven scion varieties but these were complicated by a big variation in take due largely to condition of scion wood. In the other trial the inter-compatibility of 23 scion varieties, including high quality and late maturing sorts, and three intermediates was tested. Six to eight varieties were cleft-grafted on individual scaffold branches of each tree. The same factors complicated results, differences in susceptibility of the intermediates to silver leaf being clearly shown. There was, however, up to three years from grafting, no clear evidence of the incompatibility of any of the 69 combinations tried despite the fact that one of the intermediates and some of the scion varieties were known to be normally incompatible when worked on certain rootstocks.

382. LUGEON, A. R. 634.1/2-1.541.44

La greffe en coulée appliquée aux arbres en espaliers et les problèmes de l'arcure. (Frame-working applied to espaliers and problems of arcing.)

*Rev. hort. Suisse*, 1942, 15: 7-9.

A method by which espaliers can be frameworked with scions of another variety and their subsequent treatment are described. The two espaliers in the cases discussed consisted of three and four parallel vertical branches rising from a short stem. All spurs were cut off and the wounds waxed. Scions were then veneer-grafted alternately on the right and left sides up the vertical stems, being kept in place by a brad or tack. The apex was tip grafted. Since the vertical main stems were only 40 cm. apart, according to fixed custom, and there was no intention of spurring back the new growths as heretofore, new problems of how to deal with them arose. The scion shoots were trained to grow laterally in a slightly downward sloping direction (l'arcure), while remaining as straight as possible. Later when it was found that growth and foliage was excessive some of the new laterals were cut out. The buds were removed from the upper sides of those that remained to prevent growth of vertical shoots. The laterals remaining were never shortened, otherwise they grew more wood instead of fruit. Fruiting began in the third year after reworking. The author traces the origin of espalier and other formal shapes to the days of Louis XIV when gardens themselves were laid out on a formal geometrical plan. The system grew up into a tradition which no one dared to break. Actually it lowers yields, requires much labour and is commercially unprofitable.

383. TASMANIAN DEPARTMENT OF AGRICULTURE, HORTICULTURAL DIVISION.

631.534: 634.22/23-1.541.11

Vegetative propagation of plum and cherry rootstocks by layering.

*Tasm. J. Agric.*, 1941, 12: 130

East Malling methods described.

### Rootstocks.

384. KEMMER, E., AND SCHULZ, F. 634.11-1.541.11

Versuche mit *Pirus baccata*-Unterlagen. (Trials of *Pirus baccata* as rootstocks for apples.)

*Gartenbauwiss.*, 1941, 15: 526-31.

Four varieties of *P. baccata*, namely *siberica*, *mandschurica*, *himalaica* and *jackii* were tested. All four varieties produced abundant seed, even the lowest yield, i.e. that from *P. baccata jackii*, was considerably higher than that from cultivated varieties. Although, according to Rybin, *P. baccata* is diploid, the percentage germination was low and more closely resembled that of triploids. The varieties used for grafting were Belle de Boskoop, Gold Pearmain,

Ontario, Joseph Musch and Kaiser Wilhelm. The results were unsatisfactory. In most cases the union of stock and scion left much to be desired. Only 44% of the stocks survived into the second year.

### Root growth.

385. TEAKLE, L. J. H., AND JONES, L. T.

634.11: 581.144.2

Studies on orchard soils in Western Australia.

I. The root system of the apple tree.

*J. Dep. Agric. W. Aust.*, 1941, 18: 220-7, bibl. 9.

The subjects treated are (a) the distribution of roots in a soil type at the Ilwarrara Orchard, Karragullen; (b) factors affecting root growth and distribution; (c) the functions of roots. There are four diagrams of root distribution in which are shown the influence on root development of a drainage trench and of a compact subsoil and the distribution in two different soil types.

### Pollination.

386. CRANE, M. B., AND LEWIS, D.

634.13: 581.162.3

Genetical studies in pears. III. Incompatibility and sterility.

*J. Genet.*, 1942, 43: 31-43, bibl. 14.

In these studies at the John Innes Institution tests of self-compatibility have been made in 19 diploid, 8 triploid and 2 tetraploid pear varieties. Nine of the diploid and four of the triploid varieties failed to set fruit with their own pollen. With two exceptions, one diploid and one tetraploid, the others are only self-compatible to a low degree. The diploid form of Fertility when selfed can set a full crop; but the fruits are seedless. The tetraploid form sets a full crop of fruit and seed with its own pollen. Out of 193 inter-varietal cross-pollinations only two cases of complete cross-incompatibility were established. Parthenocarpy, following self-pollination, is frequent in pears. Such fruits are often inferior in size and shape to seeded fruits. [From authors' summary.]

387. LEWIS, D., AND MODLIBOWSKA, I.

634.13: 581.162.3

Genetical studies in pears. IV. Pollen tube growth and incompatibility.

*J. Genet.*, 1942, 43: 211-22, bibl. 22.

Self-incompatibility in diploid pears is due to arrested pollen-tube growth. Three days after pollination the tubes are about one-third of the way down the style and their ends are swollen. Pollen tubes of the diploid Beurré Bedford grow as fast as those of a tetraploid variety, penetrate the style and enter the embryo-sac, but only rarely do they effect fertilization. The result of normal pollen-tube growth without fertilization is the formation of seedless fruits.

388. THOMAS, P. T.

634.13: 581.162.3

A useful abnormality of the pollen in a pear.

*Nature*, 1942, 149: 168-9, bibl. 2.

389. PASSECKER, F.

581.162.3: 634.1 + 634.2

Untersuchungen über die Befruchtungsverhältnisse von Kern- und Steinobstsorten. (Pollination trials with pome and stone fruits.)

*Gartenbauwiss.*, 1941, 15: 532-58.

Details are given of the technique used in tests of pollen germination and the results of the tests on a large number of apples and 13 apricot varieties are tabulated. The technique of pollination is described and the results of a number of pollinations of apples are discussed with reference to the findings of other workers, as are also the similar results with pears, apricots and cherries. It is noted that there are some varieties of apple that in spite of a high rate of pollen germination are incompatible with certain



other apple varieties. Winter Gold Pearmain has pollen which germinates well, but it has already been shown to be incompatible with Canada Reinette, Blenheim Orange and, in the present experiments, with Geflammt Kardinal. Among pears, Williams' is shown to be an unsuitable pollinator for Vicar of Winkfield, Diels Butterbirne and Duchesse d'Angoulême. No certain evidence of metaxenia could be found. There was, however, a relation between taste and number of seeds. The fruits with few or no seeds had not such a good flavour as those with many seeds. This was more marked in pears than in apples.

390. BUTLER, C. G., AND COCKBILL, G. F. 638.142: 621.364  
Preliminary investigations on the value of electric heating of beehives.

*Ann. appl. Biol.*, 1942, 29: 34-42, bibl. 7.  
Trials were carried out at Rothamsted in the winter of 1940/41 in collaboration with Electrical Research Association. The general effect of heating appeared in these preliminary trials to be to reduce the area of brood present in mid-April and to increase the winter consumption of stores. Colonies continuously heated throughout the winter were a little, but not significantly, better than the controls in both respects, but there was no doubt of the adverse effects of the other four heating treatments. Colonies with young queens consumed rather less stores than those with old queens. Temperatures observed and their effects on bee activity are discussed.

391. LOEWEL, E. L., AND SEEMANN, F. 638.12: 632.95  
Das Verhalten der Bienen gegenüber den gebräuchlichen Spritzmitteln des Obstbaues. (The effect of common orchard sprays on bees.)  
*Forschungsdienst*, 1941, 12: 75-87, bibl. 10.

Experiments were made in 6 × 6 × 6 m. tents at Erlangen in the years 1937-40 to determine the effect of various orchard sprays on bees. Copper chloride preparations had no ill effects. On the other hand home-made bordeaux seriously affected bee stocks. Lime-sulphur was not injurious. A Pomarsol spray alone had no ill effects but mixed with a copper chloride preparation was definitely harmful. With nicotine it proved almost harmless. Generally speaking most combinations of arsenic proved fatal. When applied in conjunction both with copper and with sulphur compounds it resulted in complete destruction of bee stocks. Details are given of the actual amounts of bordeaux and of arsenic necessary to kill individual bees.

#### Growth and nutrition.

392. GROSSE, B. 634.11-1.55: 581.144  
Die Korrelation zwischen dem Fruchttrag und dem vegetativen Wachstum bei Äpfeln. (The correlation between crop and vegetative growth in apples.)  
*Forschungsdienst*, 1941, 11: 368-84, bibl. 15.

The author gives details of observations made at Kessel near Kulmbach, Upper Franconia, and elsewhere and summarizes as follows:—Girth measurements were taken of 129 standard or half-standard apple trees and of 61 bush trees on clonal and seedling rootstocks. In many cases the spread of the trees was also taken. The mean crops for many years were compared with these figures and correlations were established. Most of the comparisons showed a more or less clear correlation between girth increase and yield; thus, inside a stand of trees, the girth and spread of which are increasing, increased crops can be expected. Where such correlation is small the locality factor is thought responsible. In one stand on seedling rootstocks the girth from a year preceding the year of cropping was submitted to statistical examination and showed definite correlation. Further, an examination of Gold Pearmain on seedling

stocks showed that the larger increase in girth is to be noted also in the stronger trees despite their larger crops. This tendency was not so marked, however, as regards average shoot length. In some instances it was possible to note the effect of rootstock in changing the relationship between the vegetative growth characters and cropping. The advice is given that the relationships here established should be carefully checked in current rootstock trials.

393. MURNEEK, A. E. 631.55: 634.11 + 634.25  
Factors affecting size and color of fruit [apples and peaches.]  
*Bull. Mo. agric. Exp. Stat.* 428, 1941, pp. 19.

A general survey of the environmental and cultural factors which may possibly affect colour and size in apples. Among conclusions reached are the following:—Excessive drought and high temperature are very harmful to growth and colour of apples. Excessive nitrogen manuring may result in decreased colour. A certain number of leaves are required for the proper development of apples and peaches. The number of leaves carried varies directly with the amount of shoot growth. Pruning helps to increase size and colour by conserving moisture and nitrogen supply if that is limiting, by increasing carbohydrate supply through development of larger leaves and their better exposure, and by reduction of shading. Size, colour and flavour can all be improved by fruit thinning. Under Missouri conditions it is reckoned that 30-40 leaves are needed for an apple and 20-40 leaves for a peach to reach full growth. Methods suggested, but still unproved, for increasing colour are the use of preharvest sprays containing naphthalene acetic acid, sodium potassium or calcium thiocyanate, sun colouring after picking of apples and branch ringing.

394. MITCHELL, J. W., AND CULLINAN, J. P. 577.15.04: 634.25 + 634.13  
Effects of growth regulating chemicals on the opening of vegetative and floral buds of peach and pear.  
*Plant Physiol.*, 1942, 17: 16-26, bibl. 10.

Detached branches of Elberta and Belle peach were sprayed with lanolin and oil emulsions containing various amounts of different growth substances and kept under controlled conditions in a greenhouse. The experiments lasted two years. In general it may be said that floral buds on both varieties opened sooner and in greater numbers when sprayed at an early stage of swelling with naphthaleneacetic acid emulsions than with emulsion alone and that this growth substance was ineffective when sprayed on fully swollen but unopened buds. Naphthalene acetamide caused earlier opening of young buds of Belle but not of Elberta. Repeated but not single applications of indoleacetic and indolebutyric acid emulsions increased the number of blossoms that opened on Belle. In field experiments on attached branches spraying with oil or water containing naphthaleneacetic acid caused buds to open earlier than others sprayed with untreated oil. There was no evidence of retardation of bloom on sprayed, attached branches; on detached branches naphthaleneacetic acid as an oil or lanolin emulsion retarded the growth of vegetative buds. Pear buds on detached branches were unaffected by any treatment except for receiving injury from repeated applications of high concentrations.

395. AITKEN, H. C. 634.11-1.55: 577.15.04  
The effect of plant hormone sprays on the dropping of apples.  
*Seventy-seventh A.R. Nova Scotia Fruitgrs' Ass. for 1940, 1941*, pp. 120-4.

Preliminary experiments at Kentville indicate that one spraying with 4-8 grams naphthalene acetic acid per 100 gallons at normal harvesting time will effectively reduce the amount of Gravenstein and McIntosh apples falling in the following 10 days and that a repetition of the treatment will have similar results.



396. AITKEN, H. C. 634.11-1.55: 577.15.04

The effect of plant hormone sprays on the dropping of apples.

Seventy-eighth A.R. Nova Scotia Fruitgrs' Ass. for 1941, 1942, pp. 44-7.

The trials with naphthalene acetic acid reported in the previous year (see above) were repeated. Conclusions reached with regard to Gravenstein were that all treatments showed less drop than the controls. Double strength, i.e. 9.6 grams per 100 gallons, gave the best control over a period of 10 days, but normal strength, i.e. 4.8 grams, was satisfactory showing only half the drop shown by the controls. Ten days appears to be the maximum time for which a single treatment will be noticeably effective, although even after three weeks all treated trees showed less dropping of fruit than the controls. As regards McIntosh in 1941 the fruits of this variety adhered to the trees with abnormally great tenacity and hormone sprays had little effect.

397. HERMAN, F. A., MACEACHERN, C. R., AND CAMERON, J. M. 634.11-1.55: 577.15.04

The prevention of premature apple fruit dropping by spraying with plant growth substances.

Seventy-seventh A.R. Nova Scotia Fruitgrs' Ass. for 1940, 1941, pp. 124-5.

In trials at the provincial experimental orchard, Berwick, a spray made from 4 oz. of Fruitone\* to 100 gallons was effective in preventing premature dropping of McIntosh apples. Its results on Red Gravenstein were inconclusive. On Ben Davis its effect was more marked in preventing undue loss due to wind.

398. SHAW, S. T. 634.11: 581.145.2

Respiration studies of developing Jonathan apples.

Plant Physiol., 1942, 17: 80-90, bibl. 6.

The Warburg apparatus employing the Barcroft differential manometer was discussed in relation to measuring the respiration of developing Jonathan apples. There was considerable variation in respiration rate between the different apples measured on the same day. The rate of respiration was high during the period immediately following "fruit setting" and then decreased gradually for the remainder of the period. When sections of fruits were used for measurement the increased surface and the effect of the wounding increased the rate of oxygen consumption about 63%. The respiratory quotient decreased from 0.84 on 23 May to 0.46 on 28 June, at which time it began to increase, and on 26 July it was 0.92. The R.Q. appeared to be little affected by the use of the wounded apple sections. [Author's summary.]

399. WALTMAN, C. S. 631.8: 634.11 + 634.25

The effect of nitrogen and phosphorus on the growth of apple and peach trees in sand culture.

Bull. Ky agric. Exp. Stat. 410, 1940, pp. 489-549, bibl. 92.

The investigations described here are supplementary to the author's previous work on the seasonal course of nitrogen and phosphorus in apple and peach trees in the orchard (Bull. Ky agric. Exp. Stat. 367, 1936). A review of the relevant literature is followed by a detailed account of the reaction of Staymared and Paducah apple trees and Elberta peach trees to seven variations of nutrient treatment, one basal complete in its nutrient content, and the others differing from it only in amount of nitrogen or phosphorus.

#### Manuring and cultural treatment

400. MEIER, K. 631.831: 634/635

Können Aschen verschiedener Art als Düngemittel für Obstbäume und in Gärten Verwendung finden? (Can different sorts of ashes be used for fruit trees and in the garden?)

Schweiz. Z. Obst- u. Weinb., 1942, 51: 22-4.

The contents in  $P_2O_5$ ,  $K_2O$  and  $CaO$  of the ash from a number of sources, e.g. different types of tree and hard and

brown coal and peat, are compared. The use of tree ash, especially as a source of available  $K_2O$ , is recommended with the proviso that it shall be kept dry before use or much of the nutrients will be washed out.

401. LAI YUNG LI, ANTHONY, R. D., AND MERKLE, F. G. 634.1/2-1.51-1.432

Influence of orchard soil management upon the infiltration of water and some related physical characteristics of the soil.

Soil Sci., 1942, 53: 65-74, bibl. 14.

A study was made of experimental orchard plots of the Pennsylvania State College under different systems of soil management and of annual and perennial cover crops to determine the effects of the different treatments on the physical characteristics of the soil and its moisture relationships. The findings show that: "Different soil covers produced marked changes in organic content and in physical properties which alter the infiltration capacity and moisture status of the soil mantle. Cultivation in the fall and spring with an annual cover crop of rye sown in the fall and millet in the spring permitted soil deterioration, as evidenced by a reduction in the organic content, the granule stability, and the probable permeability. A more compact, easily dispersed surface layer resulted, giving rise to poorer infiltration and greater erosion and runoff. Alfalfa sod harrowed only in the spring resulted in higher organic content, better structure, increased infiltration, and decreased runoff and erosion. A permanent bluegrass sod harrowed each spring gave the highest organic content and the greatest structural stability and permeability in the surface 3-inch layer, which resulted in excellent infiltration and almost no runoff and erosion. The cumulative effects of these treatments from 1926-1940 have resulted in a better moisture status in the entire soil mantle where perennial cover crops were used. There is a close correlation between changes brought about in the physical properties and the actual measurements of moisture infiltration, runoff, and moisture content in the profile. Evidently the exposure of the soil to rainfall and drying during the fall and spring preparations, together with the time required for the annual cover crops to become effective, has resulted in physical deterioration as compared with conditions found under the perennial covers."

402. PARTRIDGE, N. L. 634.1/7-1.87

Comparative water usage and depth of rooting of some species of grass.

Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 426-32, bibl. 2.

A discussion of the merits and demerits of the usual grasses used to form orchard sod in Michigan.

403. FORTIER, S. 634.1/7-1.67

Orchard irrigation.

Fmrs' Bull. U.S. Dep. Agric. 1518, 1940, pp. 27, bibl. 13, 5 cents.

This well illustrated bulletin, based largely on the practice of irrigation as developed in orchards on the Pacific slope and that part of the Rocky Mountain States which lies in the drainage basin of the Pacific, gives a full account of sites and preparation for irrigation, followed by a description of the furrow, basin and sprinkling methods, intercrops and cover crops, time and frequency of irrigation desirable, removal of excess water and winter irrigation.

404. BOWMAN, F. T., AND DAVISON, J. R. 634.22-1.67

Prunes at Yenda. Results of irrigation and soil management investigations.

Agric. Gaz. N.S.W., 1941, 52: 543-4, 585-8; 53: 27-8, 48.

The investigations into the cultural factors affecting the cropping of prunes, particularly Robe de Sargent, at Yenda, N.S.W. The orchards in question are on heavy soil on which this prune has a poor cropping record. Cultural



operations have as a result fallen into neglect and the trees lack vigour, show premature leaf fall and often a degree of autumn blossoming. Inefficient and insufficient irrigation, especially during the summer and harvest, was found to be an important cause of trouble. Since general recommendations as regards irrigation practice cannot be made to suit all conditions the amount of water to be given should be based on the evidence of soil testing. The successful methods of testing, of irrigation and of soil management used in the experiments are described. The soil management consists of allowing the natural cover of trefoil and other native herbage to grow until it seeds and dies down in summer leaving dry cover which is disced in. No further cultivation is given except a light harrowing to suppress weeds and to make an ideal bed for the prune drop. A complete fertilizer (4:14:5·2) is applied at the rate of 5 cwt. per acre in the dormant season followed by 2 cwt. per acre

of sulphate of ammonia at blossoming. The effects on the soil and on the trees of these methods are discussed.

405. D.S.I.R. NEW ZEALAND. 634.1/7  
Research progress in the orchard.  
*Orchard. N.Z.*, 1941, 14: 12:5-7.

A summary of that part of the 1940/41 report which deals with orchard research. See *H.A.*, 11:1518.

406. JONES, L. T. 631.874  
Composts. Turning waste material into valuable manure.  
*J. Dep. Agric. W. Aust.*, 1941, 18: 210-6, bibl. 14.  
MAINE AGRICULTURAL EXPERIMENT STATION.  
631.8  
Official inspection 173. Commercial fertilizers, 1939, pp. 47-98.

## SMALL FRUITS, VINES AND NUTS.

407. ATKINSON, H. J., AND WRIGHT, L. E. 634.711-1.4  
Studies on some raspberry soils of British Columbia.  
*Sci. Agric.*, 1942, 22: 287-97, bibl. 15.

In 1938 the Division of Horticulture, Central Experimental Farm, Ottawa, brought the attention of the Division of Chemistry to bear on the still unsolved problem of raspberry decline in British Columbia. The trials here described are the result. The authors summarize as follows:—This investigation dealt with a number of soil samples from areas which showed varying levels of raspberry growth. Some of the factors examined were pH values, carbon and nitrogen contents, available phosphorus, water-soluble sulphates, water-soluble boron, water-holding capacity, exchangeable bases, displaced soil solution, proximate analysis of the organic matter fraction, and the effect of sterilization on most of these values. The soils appeared to be well supplied with organic matter. Their water-holding capacity was quite high for mineral soils. Of the factors studied, the only one that seemed to show a relationship with the level of raspberry growth was the boron content of the soil samples. The samples from all the areas showing good growth had higher boron contents than those from the areas of poor growth, and the sample from the area where excellent raspberry growth had been obtained had the highest boron content of all. It has been shown that the beneficial effects of sterilization of the soil may be due to a number of factors.

408. STENE, A. E., AND CHRISTOPHER, E. P. 634.73-1.535  
Some problems affecting the rooting of hardwood blueberry cuttings.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 259-61, bibl. 1.

In blueberry trials at the Rhode Island Experiment Station in 1940 rooting was better in the cheaper cold frame than in box frames. Peat alone as a medium, especially the coarse granular type, was found satisfactory. Ventilation appeared to be unimportant, though it is admitted that all the frames were somewhat exposed to wind.

409. DUNSTER, B. P. 634.75  
*Fragaria tinuatae*.  
*Gärtn. Chron.*, 1942, 111: 59.

*Fragaria tinuatae*, the Japanese strawberry, though not equal in quality to many of the small alpine varieties in cultivation, has so far proved immune to the many diseases that infect cultivated strawberries in Great Britain.

410. GRAY, G. F. 634.75: 581.11  
Transpiration in strawberries as affected by root temperature.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 269-73, bibl. 1.

A progress report on trials at Stillwater, Oklahoma. It would appear from the data obtained that (a) soil culture

potometers for measuring transpiration show more normal plant behaviour than water culture potometers; (b) varieties of strawberry susceptible to injury from drought and high temperature have a higher transpiration rate than resistant varieties; (c) leaf scorch at high temperature may be due to inability of roots to absorb moisture fast enough; (d) evaporating power of the air has a more direct effect on transpiration rate than root temperature.

411. WALDO, G. F., AND DARROW, G. M. 634.711-1.523  
Breeding autumn-fruiting [red] raspberries under Oregon conditions.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 274-8, bibl. 1.

- CHANDLER, F. B. 634.73  
The relationship of different methods of expressing size of blueberry fruits.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 279-80.

- MORROW, E. B., AND DARROW, G. M. 634.75: 575  
Inheritance of some characteristics in strawberry varieties.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 262-6.

412. MOOG, H. 634.8  
Beiträge zur Ampelographie. VII\* Mitteilung.  
(7th Report on ampelography.)  
*Gartenbauwiss.*, 1940, 15: 48-108.

In continuation of previous papers 53 varieties and types are described.

413. SACONE, R., AND TOBLER, H. D. 634.8-1.547.6  
Antecedentes para el estudio del problema de la madurez de las uvas. (Preliminaries to a study of ripening in grapes.)  
Reprinted from *Rev. Fac. Agron. Montevideo*, 1941, No. 23, pp. 40, bibl. 11.

Analyses are given of the density and sugar:acidity relationships in a number of table and wine grapes harvested on different dates and these are followed by a consideration of the results achieved on the same lines by other research workers.

414. GIESECKE, F. 634.8  
Probleme der Grundlagenforschung in ihren Beziehungen zum Weinbau. (Basic research problems of viticulture.)  
*Forschungsdienst*, 1941, 11: 619-30, bibl. 83.  
ZIMMERMANN, —. 634.8-1.521  
Die Aufgaben der Rebenzüchtung in Baden. (The task of the vine breeder in Baden.)  
*Forschungsdienst*, 1941, 11: 631-5.

\* For previous articles, see *H.A.*, 5: 205.



- VOGT, W. E. 634.8  
Badens Weinbau. (Vinegrowing in Baden.)  
*Forschungsdienst*, 1941, 11: 636-8.
- VOGT, W. E. 634.8  
Wein und Weinbau in Elsass. (Wine and viticulture in Alsace.)  
*Forschungsdienst*, 1941, 11: 639-41.
415. SCHNEIDERS, E. 634.51-1.541.11  
Die Abrissvermehrung bei Walnüssen. (Stoolbeds for walnut propagation.)  
*Dtsch. Obstb.*, 1940, Hft 11, p. 212, from abstract  
*Forschungsdienst*, 1941, vol. 11, abstr. p. 63.  
Good rooting was obtained in walnut stool beds. Strong one-year-old seedlings or strong grafted plants were pruned hard just before starting into growth in the seedbed. The best results followed subsequent wiring of the young shoots. These produced plenty of callus and developed roots in the second year. The hope seems justified that it may be possible in this way to produce dwarf clonal rootstocks, on which bush forms of walnut may be grown. Propagation by layering should be tried for those varieties which provide rootstocks capable of being worked in the open, e.g. *Juglans nigra*, *rupestris*, *sieboldiana*, *cinerea*, *mandschurica*, and *californica*.
417. STEVENS, N. E., AND STEVENS, R. B. 632.3/4+632.8  
Recent developments in plant diseases in the United States.  
*Bot. Rev.*, 1941, 7: 714-36, bibl. 29.  
The diseases reviewed are those of recent appearance in U.S.A. or those which have experienced marked fluctuations in extent or severity and about which information is fairly complete or reliable. They are as follows:—Dutch elm disease, wasting disease of *Zostera marina*, X-disease of peach, downy mildew of tobacco, bacterial wilt of corn, bunt, *Cercospora* foot rot, stem rust and leaf rust of wheat, bean rust, late blight and bacterial ring rot of potato.
418. WILSON, G. F. 634.1/7-2.3/8  
Hygiene in the war-time fruit garden: winter operations.  
*J. roy. hort. Soc.*, 1942, 67: 28-30.  
The measures outlined are subsidiary to spraying and are directed to owners of small gardens, especially to those with neglected trees. They include pruning, bark scraping, rubbish clearance and grease banding. The pests against which these operations are directed are briefly indicated.
419. EIDE, C. J., AND CHRISTENSEN, C. M. 634.11-2.4  
Wood decay in apple trees in Minnesota.  
*Phytopathology*, 1940, 30: 936-44, bibl. 8.  
In 1936, 1937 and 1938 the authors felled and examined more than 150 apple trees from 10 to 30 years old. Their observations show that rot enters apple trees in Minnesota chiefly through branch stubs but partly also through crotch injuries, sunscald and frost cracks at an early period of their lives. Most trees of 30 or more years old were thoroughly decayed, rot often extending out to or through the bark over part of the circumference of the trunk, appearing sometimes to have weakened or killed the cambium and inner bark. Ten species of wood-rotting fungi were identified and even more were isolated but not identified. No one species or combination of species was found often enough to be considered responsible for the major part of the decay. It is thought that rot not only accompanies but may also be one of the causes of the early decline of apple trees in marginal regions of apple production.
416. HUNTER, J. H., AND LEWIS, R. D. 634.521-1.8  
Influence of fertilizer and time of its application on growth, yield and quality of pecans.  
*J. Amer. Soc. Agron.*, 1942, 34: 175-87, bibl. 4.  
The tree growth and nut yield and quality are reported of 14-year-old Moore pecans grown on Greenville sandy loam in Lee County, Georgia, with fertilizer applied at different times. The trees were planted 20 to the acre, were selected for uniformity and for 5 years previous to the experiment had received annually an average of 20 lb. per tree of 4-6: 8-4: 4 fertilizer. The fertilizer applied during the trials was 6: 8: 4 at the rate of 1,200 lb. per acre for the first 3 years and 4: 8: 4 at the rate of 1,000 lb. per acre for a further two years. All fertilizer treatments increased growth and nut yield. The greatest increase of growth was obtained from 6 light applications applied in January, February, April, June, August and October. Nut yield was unaffected by time of application. Poorest quality nuts, as measured in terms of specific gravity and percentage of well-filled nuts, were produced on trees receiving half fertilizer in February and half in June, the best quality being produced on unfertilized trees. There was an inverse correlation between the size and the yield of nuts. The wide variation in oil and protein content between the 2 "on-year" crops of 1937 and '39 could not be correlated with fertilizer treatment. On the basis of economy one single fertilizer treatment in February is advocated.
420. TIRELLI, M. 632.953: 634.1/7  
La cura degli alberi cariati. (Tree surgery.)  
*Ital. agric.*, 1942, 79: 33-41.  
A well illustrated account based mainly on observations in the U.S.A. of the best method of dealing with hollow trees or trees which have sustained appreciable damage to their trunks and need attention. The author deals in a simple way with the cleaning out of the cavity and its refilling with cement or asphalted wood blocks and with the use of metal bands driven right through the trunk and secured with nuts at each end to prevent future opening.
421. MODLIBOWSKA, I., AND FIELD, C. P. 634.1/2-2.111  
Winter injury to fruit trees by frost in England, 1939-40.  
*J. Pomol.*, 1942, 19: 197-207, bibl. 18.  
In December 1939 at East Malling temperatures of 18° and 12° F. were registered in the Stevenson screen in the 3rd and 4th weeks respectively. In January 1940 there were only 3 nights without a frost. In the 1st and 2nd weeks the night temperature fell to 17° and 16° F. respectively; on the night of 19th/20th a temperature of 2° F. was recorded and it fell below 25° F. every other night that week. In the last week of the month 9° F. was recorded on 24 January. During the first 3 weeks of February there was frost every night except 4, the lowest readings being 24° F. in the first and 18° F. in the third weeks. Most of the authors' summary is given below:—Older trees suffered less than younger ones. No trees or branches were killed outright, but cracking and lifting of the bark of the trunk, and sometimes of the crotch and branches, occurred in five varieties of apple, one of pear and one of damson. One-year-old wood, fruit- and wood-buds of pears were injured. The outer rind of loganberries suffered, and canes of older plants were killed. Unearthed quince stool beds were badly damaged. Damage was greatest in the lowest-lying parts of the plantations and most frequent on the sides of the trunks exposed to the S. and S.W. Apple trees which had a double dressing of potash suffered more than those with a single dressing. Fastening down the loosened bark with small nails inserted in two rows on each side of the longitudinal cracks in the bark and sealing the cracks with



vaseline proved a useful remedial measure, for healing was more rapid and satisfactory in nailed than in unnailed trees. The uplifted bark carried the cambium with it; callus formed on the inner surface of the bark and eventually new phloem and xylem were produced there. No callus formed on the wood. In bark raised mechanically from healthy trees in April, when sap-flow had already started, cleavage took place in the cambium itself, part of it remaining attached to the wood and the other part to the bark; callus was produced from both portions. In no instance was the winter injury so severe as to affect the subsequent development of foliage, growth or fruiting of the trees, which remained apparently normal up to October 1941.

422. CORNFORD, C. E., AND BAGENAL, N. B. 634.1/7-2.111  
Notes on the winter injury to fruit trees in England, 1939-40.  
*J. Pomol.*, 1942, 19: 208-11.

These notes supplement the information given on winter damage at East Malling in 1939/40—see previous abstract—by showing how trees were affected in other parts of Kent where in many cases temperatures fell lower than at East Malling. In addition answers to questionnaires on the subject received from growers in Cambridge, Hants, Hereford, Kent, Norfolk, Surrey and Sussex are here summarized. In the survey of Kent severe injury was also found on plum trees in three farms near Canterbury and elsewhere on cherries. There were also indications here that the older trees (often much older than those at East Malling, none of which is more than 25 years) were more damaged than the young ones. Bramley's Seedling formed a large part of these older trees and was the most damaged variety and was followed in extent of damage by Grenadier. It is suggested that a partial reason for the severe damage caused was the bearing of a heavy crop in 1939. Answers to the questionnaire suggested that Cox's Orange Pippin was the worst victim, some 12 other varieties being also affected, Bramley's Seedling not being included, possibly because those existing on the farms were not of a comparable age to those damaged on the Kent farms. The nature of the damage varied from small longitudinal cracks a few inches long to splits 3-4 feet long. Some growers had nailed the bark down. The best results from nailing were obtained by using large-headed nails immediately after the occurrence of the damage.

423. HERBST, W., AND SCHANDERL, H. 634.1/2-2.111: 581.145.1  
Beiträge zur Untersuchung der Frostwirkungen auf die Obstblüte. (Frost effects on fruit blossom.)  
*Landw. Jb.*, 1940, 90: 495-518, from abstract  
*Forschungsdienst*, 1941, Vol. 11, abstr. p. 101.

The effects of spring frosts on fruit blossom were calculated by phenometrical methods. Even mild frosts had their evident effect on the process of blossoming, though trees so affected quickly recovered. If such frosts come in the middle of the blossoming they have little effect, but if at the beginning they result in a definite check. More severe frosts have more serious effects. The blossom varies in its resistance according to the organ itself, its position and stage of development. Pollen germination capacity following frost was studied in many different fruits. Riper pollen offers greater resistance to frost than less ripe pollen. Frost resistance in pollen varies in different fruits and varieties. Notes are given of its resistance in different cases. Size of crop after frost damage sometimes depends on whether the flowers were caught before or after pollination. The decrease in crop is less when the flowers have already been pollinated at the time of the frost. In pears the damage is made good in some cases, e.g. Bergamotte d'Esperen, Nouveau Poiteau, by parthenocarpic production of fruit.

424. GUENTHER, —. 632.111: 634.1/2  
Kältetod der Obstbäume und Massnahmen zu seiner Verhütung. (Death by freezing of fruit trees and methods of preventing this.)  
*Forschungsdienst*, 1941, 11: 713-6.

Very great damage was done to fruit trees in the Warthe district of Germany by the hard winter of 1939/40. Peaches proved to be the least hardy of all and they were followed in ascending order of hardness by quince, dessert pears, apricot, late apples, zwetschen, plums, sweet cherry, green-gage and egg plums, mirabelles, early cooking pears, sour cherries, early apples and hardy autumn and winter apple varieties. After discussing the relative susceptibility of different parts of the tree the author notes that the basic cause of damage lay in insufficient ripening of the tissues. This could be seen in the comparative immunity to damage of early apple varieties as against the considerable damage sustained by the late varieties. Loss was so great that in the author's opinion it is essential to replant with winter hardy varieties only. Among those suggested by him for this purpose are Weisser Klarapfel, Red Astrachan, Titovka, Fraas Sommerkalvill, Apfel aus Croncels, Antonovka strains, Schöner aus Nordhausen, Litauscher Pepping, Signe Tillisch, Schöner aus Herrnhut, Graf Nostiz, Welsch Weinling, Prinz Albrecht v. Preussen and Wealthy. Although he does not consider that either the rootstock or the intermediate can have appreciable influence on the hardness of the variety, he thinks it essential that the rootstocks should themselves be frost-hardy. He recommends as a hardy rootstock for apples *Malus prunifolia*, and as a stem builder Antonovka; for pears he recommends the Russian Sacharnaja, for sweet cherries Leitzkauer Presssauerkirsche and for plums and zwetschen Wilhelmine Späth. He notes the claim made by Michurin that the use of Antonovka as a mentor grafted in the crown of a susceptible variety can induce hardness. Sunscorch due to frost can be avoided by painting the trunk with milk of lime.

425. SCHMITSCH-HÜBSCH, H. 634.11-2.111-1.541.11  
Frostschäden in Obstanlage und Baumschule. (Frost damage in fruit plantations and nurseries.)  
*Dtsch. Obstb.*, 1940, Hft 10, p. 185, from abstract  
*Forschungsdienst*, 1941, Vol. 11, abstr. p. 96.

An important factor which probably contributed to the great frost susceptibility shown in German orchards in 1939/40 was the late cessation of growth due to the very wet autumn. Young nursery specimens as well as established trees on seedling stocks suffered worse than those on Malling type I, II, V and IX rootstocks. A number of trees on Malling XVI suffered badly, pears on quince C without exception and a considerable proportion of pears on quince A were damaged. Plums and zwetschen on myrobalan and black damas suffered worse as the result of late cessation of growth than those on Brussels and Ackermann's plum. Among the myrobalans the Pfälzer clone suffered most. Least damage was done to apple trees on stembuilders, e.g. Genereuse de Vitry, Gelber Trier, Schwarzer von Vitry, Croncels and Pomme d'Or. Gellert's Butterbirne proved a good stembuilder for pears. For plums Crescinsky and Bühlertal proved much more frost-susceptible than Brussels. Trees pruned before the frost generally suffered much more than those pruned afterwards.

426. KRUFF, FR. 634.1/2-2.111  
Zur Frage der Frostwiderstandsfähigkeit bei Kern- und Steinobstarten. (Frost resistance in pome and stone fruits.)  
*Dtsch. Obstb.*, 1940, Hft 11, pp. 205-9 from abstract  
*Forschungsdienst*, 1941, Vol. 11, abstr. p. 15.

The author insists that the hardness of fruit varieties cannot be judged from particular instances. Very much depends on the health and nutritional conditions of individual trees. Further the rootstock is very important. Details are given



of the effects of frost in the gardens of the Geisenheim Horticultural Research Station in 1939/40 on some 150 apple varieties (5-7-year-old bush trees on EMIX) on more than 100 pear varieties (7-year-old bushes double-worked on quince A), on some 50 sweet and sour cherries (17- and 8-year-old trees on mahaleb) and on some 50 plum, zwetschen, greengage and mirabelle plum varieties. Particulars are given of soil composition, temperatures, rainfall, snow depths, and finally hours of sunshine during the months of October 1939 to May 1940 inclusive.

427. LOEWEL, E. L., AND SCHUBERT, W.

634.11-2.111-1.541.11

Über das Verhalten von Apfelstammbildnern im kalten Winter 1939/40. (The behaviour of apple stem builders in the hard winter of 1939/40.) *Gartenbauwiss.*, 1941, 15: 463-70.

The experiments were planned to test the influence of the apple stem builder on the variety with regard to frost-resistance. In 1931, three variety experiments were planted consisting of 49 different varieties. In two plots the stock was the usual seedling and the stem builder was Belle de Boskoop. In the third plot the stem builder was Transparent de Croncels. In the spring of 1939, severe frost damage was noticed on the stems of the Boskoop stem builder. The tabulated results show that the susceptibility to frost of the stem builder affects that of the grafted variety, as almost all trees worked on Boskoop suffered from the cold, while the same varieties, with the exception of Cox's Orange and Ontario, worked on Transparent, survived without injury.

428. LOEWEL, E. L., AND KASSAU, H. 634.11-1.541.11

Das Verhalten bekannter Apfelstammbildner in der Baumschule. (The behaviour of well known apple stem builders in the nursery.) *Gartenbauwiss.*, 1941, 15: 565-75.

From the results of a questionnaire sent out to 35 well-known nurseries as to the most used stem builder, a collection of 14 stem builders was made and their behaviour studied with regard to growth, frost-resistance, resistance to woolly aphid, scab and canker and their reaction to scion varieties. The most marketable variety is Rapid, whose only disadvantage is its susceptibility to woolly aphid. Next most marketable, about 71%, come Croncels, Roter Ziegler and Noire de Vitry. Then follow Newton Pippin, Ruhm von Kirchwärdler and Pomme d'Or. Herzogin Olga and Klitzing Apfel were less satisfactory, while Boskoop, Gelber, Trierischer Weinapfel, Président Descour, Echte Altländer Pfannkuchenapfel and Beauty of Bath are not recommended, chiefly owing to frost susceptibility.

429. LOEWEL, E. L., AND SCHUBERT, W.

634.1/2-2.111-1.541.11

Der Einfluss der Unterlage auf die Frostwiderstandsfähigkeit verschiedener Apfel- und Pflaumen-sorten. (Rootstock influence on frost resistance in different apple and plum varieties.) *Gartenbauwiss.*, 1941, 15: 453-62.

The cold winter of 1939/40 offered a valuable test of the resistance to frost of apple and plum varieties and especially of the effect of the stocks on the scions in the lower Elbe district. The stocks in the first experiment were the East Malling types II, IV, V, IX, and XVI, and these had been grafted in March 1938 with the varieties, Boskoop, Goldparmäne, Cox's Orange, Zuccalmaglio, Berlepsch, Nordhausen, Allington, James Grieve and Ontario. The tabulated results show the unsatisfactory behaviour of type XVI, only 39-2% of the trees grafted to this stock being undamaged. Except for Boskoop, Nordhausen and James Grieve, total losses occurred among the other varieties. The same effect was shown among the varieties grafted on to type XI, of which, however, 55% of the trees were undamaged. Cox's Orange and Berlepsch suffered most on type IV while on type V the behaviour of all

varieties was about the same. On type II the most damaged were again Cox's Orange and Berlepsch. Varieties on type IX with the exception of Cox's Orange and Zuccalmaglio suffered hardly any damage. It was clear that the stock with the weakest growth was least susceptible to frost injury, owing, it is suggested, to the early ripening of the wood. For purposes of comparison, the variety Boskoop was found to be one of the best. At the same time another experiment was made on higher ground with E.M. types I, III, IV, V, VI, VII, X, XIII and XVI, and the scions were the three varieties Ontario, Goldparmäne and Cox's Orange. Of these, Ontario and Cox's Orange were most damaged by frost. In the stocks the same tendency was noted, namely for the greatest frost injury to occur in the more quickly growing trees. The varieties of plum used as scions were: Czar, Emma Leppermann, Grosse Grüne Renecode, Eisinger Frühwetsche and Hauszwetsche. The stocks were: I. Vegetative stocks: Ackermann-Pflaume (Marunke), Hüttner 3, Kroosjes gelb and Toulouse. II. Seedling stocks:—Briancan, Damascena blanc echt, Damascena noir, Runde Damascena, Damascena blanc falsch, Hauszwetschensämling, Juliana and Myrobalana. It is noted that here the rootstocks had little effect. The greatest injury was suffered by Grosse Grüne Renecode, Czar, Eisinger and Hauszwetschen. Emma Leppermann remained mostly uninjured. It is concluded that resistance to frost injury in the plum is therefore not to be sought by way of the stock.

430. RÖHDE, G. 633/635: 631.8: 632.111

Der Einfluss der Mineralstoffe auf die Winterfestigkeit der landwirtschaftlichen Nutzpflanzen. (The effect of minerals on cold resistance of staple crops.)

*Ernähr. Pfl.*, 1942, 38: 6-8, 14-8, bibl. 113.

The author quotes the evidence of many workers to show that the presence of potash in soil increases the cold resistance of a large number of plants including rape, flax, soya and other beans, peas, potato, egg plant, tomato, tobacco, cucumber, spinach, pears, plums, strawberries, vines, oranges, lemons, pineapples, olives, and bananas. A summary of his examples shows that K, P, Mg, Fe, Cu and Cl make for hardness, and so influence plant metabolism as to ensure growth at lower temperatures. Ca, Mn, Na, B, S, and Si on the other hand tend to produce decreased hardness. Degrees of cold resistance vary in different parts of the same plant according to the mineral content of the parts concerned. Further it is shown that all environmental factors such as low temperature, lack of water and bright light which increase cold resistance, also result in an increased K content in the plant and of those minerals which tend to flavour the intake and effects of K in the plant.

431. KESSLER, K. 632.111

Die Beregnung als Frostschutz. (Watering as a protection against frost.)

*Sonderdruck des RKTL* 27, Paul Parey, Berlin, from *abstract Forschungsdienst*, 1941, Vol. 11, abstr. p. 93.

An account of experiments made in conjunction with the German Meteorological Service on the possibility of using water to prevent frost damage. The grounds on which such hopes are entertained and the technique of applying this artificial rain are discussed [in the original article.—ED.].

432. ADAMETZ, L. 634.11-2.111+2.42

Vierzigjährige Erfahrungen über Frost- und Schorffresistente Apfelsorten im Altwatergebiet. (Forty years experience on frost and scab-resistant apple varieties.)

*Gartenbauwiss.*, 1941, 15: 487-508.

A discursive account of apple cultivation in the Tess valley and the search for frost-resistant varieties and varieties resistant to scab. Many varieties that survived undamaged the winter of 1928/29 succumbed to the severe winter of 1939/40.



433. WORLOCK, R. F. 634.1/7-2.112  
El blanqueo de los troncos de los arboles frutales.  
(Whitewashing fruit tree trunks to prevent sunburn.)  
Rev. B.A.P., 1941, 25: 289-27, 29, 31.

In the Argentine apples, plums, cherries, and to a lesser extent other kinds of orchard trees are susceptible to sunburn on the trunks, especially when growing on sandy or light soils. Fully grown orchards and nurseries are seldom affected since in each case adequate shade is provided by the foliage. Young orchard trees are susceptible for a few years until they have provided a sufficient canopy and any tree temporarily exposed, as by heading back for grafting. A badly sun-scorched tree seldom recovers its full vitality and is best replaced. A difference in colour between the bark of the trunk and that of the branch wood is a symptom, e.g. in the peach *Deliciosa* scorched bark is much paler. Temporary protection can be given to dormant trees in spring or autumn by a few cut boughs placed against the trunk. A severe burn in spring will often cause defoliation of the tree. The most dangerous hours in spring are between 3 and 5 p.m. The simplest preventive measure is to whitewash the trunks, a suitable mixture being lime 5 kg., common salt  $\frac{1}{2}$  kg., powdered sulphur  $\frac{1}{2}$  kg., the lime being dissolved in 5 litres of water before the remaining ingredients are added. The mixture is thinned by the addition of more water and is painted on the trunks with a brush or sprayed on in the case of larger trees.

434. KELSALL, A., AND EAVES, C. A. 634.11-2.19  
Control of corky core.  
Seventh-seventh A.R. Nova Scotia Fruitgrs' Ass.  
for 1940, 1941, pp. 132-3.

In experiments at Waterville, N.S., on Cortland apple trees boron was found to remedy the condition known as corky core. Applied at  $\frac{1}{2}$  lb. borax per small, young, bearing tree it effected not quite a complete cure, one tree out of thirteen still showing corky core. At higher dosages control was complete. Control was complete also when borax was applied at the rate of 2½ lb. per 100 gallons in combination with flotation sulphur and lead arsenate in the calyx spray.

435. CATON, D. 634.2-2.8  
The line pattern virosis of the genus *Prunus*.  
Phytopathology, 1941, 31: 1004-10, bibl. 7.

Abundance and Red June plums in Michigan having apparently normal leaves were found capable of transmitting to peach trees by grafting a virus disease expressed as a faint mottling of either a line pattern or diffused type. The disease is also transmissible to mahaleb cherries. The name "peach line-pattern virosis" is proposed and the reasons for its selection are discussed.

436. KING, M. E., AND HARRIS, R. V. 634.75-2.8  
Studies in strawberry virus diseases. IV. Symptom expression of yellow-edge in the variety Royal Sovereign.  
J. Pomol., 1942, 19: 212-26, bibl. 4.

Symptom expression of yellow edge in the East Malling selections of Royal Sovereign is closely correlated with the interaction of temperature and soil moisture. Three phases are recognized and discussed. No simple nutritional explanation has been found for the differences in intensity of the symptoms. The first result of infection is a flattening of the plants followed later by reduction in size. Affected plants show much reduced runner production. Symptoms begin to be evident a week to a fortnight after the establishment of an air temperature of more than 60° F. and ample soil moisture. During such periods roguing is possible and should be carried out.

437. KING, M. E., AND HARRIS, R. V. 634.75-2.8  
Studies in strawberry virus diseases. V. The use of *Fragaria vesca* L. as an indicator of yellow-edge and crinkle.  
J. Pomol., 1942, 19: 227-42, bibl. 10.

1. A method is described of grafting strawberry plants by inarching stolons with stolons or with leaf petioles. 2. This

method was used to determine the virus content of selected stocks of a number of varieties of strawberries by inarching plants of those stocks to healthy indicator plants. 3. Of several possible indicator plants tried the most satisfactory was the common wild strawberry, *Fragaria vesca* L. 4. Certain selections of the susceptible varieties Royal Sovereign, Sir Joseph Paxton and King George were found to induce no visible reaction in *F. vesca*, and were thus considered to be virus-free. 5. Selections of certain varieties that showed no symptoms of disease themselves transmitted disease when grafted to *Fragaria vesca* in which symptoms became evident. 6. Nearly all the selections of such carrier varieties induced symptoms in *F. vesca* and were, therefore, not virus-free, but one strain of Huxley's Giant appeared to be quite free from viruses and is being propagated for further trials. 7. Observations and experiments on possible seed transmission of strawberry viruses yielded negative results. [Authors' summary.]

438. LACEY, M. S. 634.75-2.314  
Studies in bacteriosis. XXV. Studies on a bacterium associated with leafy-galls, fasciations and "cauliflower" disease of various plants. Part IV. The inoculation of strawberry plants with *Bacterium fascians* (Tilford).  
Ann. appl. Biol., 1942, 29: 11-5, bibl. 2.

Evidence is given that *B. fascians* can produce disease in young strawberry plants in the absence of wounds.

439. CASS-SMITH, W. P. 634.11-2.42  
A note on the occurrence of grey mould or *Botrytis* rot of apples.  
J. Dep. Agric. W. Aust., 1941, 18: 217-20, bibl. 1.

For climatic reasons the recurrence of *Botrytis* rot of apples is likely to be only spasmodic in Western Australia. Its incidence and symptoms there are recorded.

440. BAUR, K., AND HUBER, G. A. 632.42: 634.1/2  
Effect of fertilizer materials and soil amendments on development of apothecia of *Sclerotinia fructicola*.  
Phytopathology, 1941, 31: 1023-30, bibl. 7.

In western Washington calcium cyanamid applied to the ground as a dust was effective in the control of brown-rot of pines, *Sclerotinia fructicola*, by preventing the development of apothecia if the treatment was given just prior to apothecial emergence. Aqueous solutions of 3 fertilizer salts proved ineffective. A duster especially designed for the application is described.

441. SINGH, U. B. 634.11-2.4  
Sooty-blotch and fly-speck of apple fruit in Kumaun.  
Indian J. agric. Sci., 1941, 11: 597-602, bibl. 9.

Sooty blotch and fly speck on apples caused by the fungus *Leptothyrium pomi* is a serious disease in Kumaun. Four sprays with lime sulphur or Avon's colloidal sulphur, i.e. at open cluster, petal fall, fruit formation and maturity stages controlled the disease but were too expensive. Thinning the fruit to 1½ fruits retained per cubic foot of the volume of the tree appreciably decreased incidence without decreasing gross weight of fruit gathered. The thinned trees produced larger and better coloured fruit. In storage the disease was controlled by washing with a 5% solution of bleaching powder or a 3% solution of sodium chlorate.

442. ROBERTS, J. W. 634.25-2.4  
The constriction disease of peach.  
Phytopathology, 1940, 30: 963-8, bibl. 14.

A disease of minor importance thought to be the same as that described in England as due to *Diaporthe pernicioso*. In its other stages it is shown to be a species of *Phomopsis*.



443. MITTMANN-MAIER, G. 632.48: 634.11 + 634.13  
Untersuchungen über die Anfälligkeit von Apfel- und Birnensorten gegenüber der Moniliäfrucht-fäule. (The susceptibility of apple and pear varieties to *Monilia* fruit rots.)  
*Gartenbauwiss.*, 1940, 15: 334-61.  
During the years 1937-1939, 158 apple and 111 pear varieties were studied at Geisenheim, observations being made on ripe fruits during September and October artificially inoculated with *Monilia fructigena* and *M. cinerea*. The most resistant apple varieties were:—Rheinischer Bohnapfel, Pomeranzenapfel, Zwiebelborsdorfer, Roter Winterstettiner, Gelber Winterstettiner, Medina and Ribston Pippin. Of the pear varieties, the Geisenheim-bred variety, Sämling Muth, was the most resistant, other relatively resistant varieties being:—Gestreifte St. Germain, Olivier de Serres, Edelcrassane, Souvenir de Constantin Bernard, Charles Cognée and Schöne Angevine.
444. HERBST, W. 632.42: 634.1/7  
Zum Stande unserer Erkenntnis über die Biologie des Fuskladiums. (Our present knowledge of the biology of *Venturia* spp.)  
*Forschungsdienst*, 1941, 11: 553-65.  
The points reached in the solution of the following problems of orchard scab are discussed: (1) The economic and nutritional importance of scab and the necessity for intensive control. (2) The life cycle of the organism and its variation under different conditions. (3) The biological reasons which expose different host plants to scab attack. (4) The course of parasitic relations as between host and fungus, including their dependence on environment, especially climatic factors. (5) Possibility of intensive scab control in Germany.
445. STOLL, K. 634.11-2.42  
Untersuchungen über den Apfelmehltau (*Podospheera leucotricha* [Ell. u. Ev.] Salm.). (Investigations on apple mildew.)  
*Forschungsdienst*, 1940, 11: 59-70, bibl. 8.  
A discussion on how best to determine the amount of effect of the three factors, local climate, soil and rootstock, on the incidence of apple mildew.
446. THURSTON, H. W., Jr., and others. 634.23-2.95  
Interstate co-operative experiments on field spraying of sour cherries.  
*Phytopathology*, 1941, 31: 1047-50.  
In interstate experiments for control of cherry leaf spot (*Coccomyces hiemalis*) in Pennsylvania, Virginia and West Virginia, Bordeaux mixture and tank-mix copper sulphate were eliminated as reducing the size of fruit compared to the usual lime sulphur spray, while non-sprayed trees produced the largest fruit. Lime sulphur and phenothiazine should be eliminated because of consistent failure to control leaf spot. Other materials showed inconsistent effect upon leaf retention. ZO and Basi-Cop were not successful under conditions of heavy infection in Pennsylvania and Virginia but gave excellent leaf retention under lighter infection in Western Virginia where leaf spot epiphytic began rather late. Had the experiments been run in W. Virginia alone at least another year would have been necessary to make this fact apparent.
447. DU PLESSIS, S. J. 634.8-2.4  
Isariopsis leaf-spot in vines.  
*Fmg S. Afr.*, 1942, 17: 60-5.  
*Isariopsis* leaf spot (*I. fückelii*) of vine was reported for the first time for South Africa at Stellenbosch in 1939-40. Although the leaves only are affected the heavy premature dropping which ensues may seriously weaken the vine. The symptoms are the appearance of more or less circular spots in large numbers, which cause gradual yellowing and browning of the leaves, starting at the top. Such leaves are easily torn by the wind. The best control is got by sulphur dusting (a) when the young season's shoots are 10 inches long, (b) after flowering, (c) four weeks after (b), (d) immediately after picking the grapes.
448. JACOB, H. E., HEWITT, W. B., AND PROEBSTING, E. L. 634.8-2.654.2  
Red leaf of grapevines in California prevented by controlling mites.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 285-92, bibl. 5.  
A serious type of red leaf disease in *Vinifera* vines in California resulting sometimes in complete loss of crop has been investigated. It was found impossible to correlate its incidence with nutrient deficiencies nor did irrigation or selenium treatment help the vines. It was found to be closely associated with mite, *Tetranychus pacificus*, injury. Control of the mites in the early stages prevented its development but killing them after the red colour had already developed in the leaves failed to check it. Early summer spraying with Selocide and ammonium polysulphide was effective.
449. PATCH, E. M. 632.753  
Food plant catalogue of the aphids of the world including the *Phylloxeridae*.  
*Bull. Me agric. Exp. Stat.* 393, 1938, pp. 35-431.  
This monumental compilation from aphid literature up to and including 1935 is divided into the following sections:—Food plant catalogue pp. 36-261; Aphids for which food plants are not recorded here pp. 261-265; Bibliography of references cited in the bulletin pp. 266-320; Index to plant families pp. 321-327; Index to aphids pp. 329-430.
450. RAHMAN, K. A., AND KHAN, M. A. W. 632.753: 632.96: 634.11  
Observations on *Aphelinus mali* Hald in the Punjab.  
*Indian J. agric. Sci.*, 1941, 44: 46-50, bibl. 4.  
An account of the attempts to establish the woolly aphid parasite, *Aphelinus mali*, in the Punjab. Methods are described which succeeded in maintaining the parasite population in the face of the annual spraying with Diesel oil emulsion against San José scale and the attacks of various predators on aphid already containing the parasite.
451. YOTHERS, M. A., AND ALLEN, P. B. 632.754: 634.1/2  
Observations on the biology and control of the tree hopper *Heliria praealta* (Fowler) in orchards of the Pacific Northwest.  
*Circ. U.S. Dep. Agric.* 606, 1941, pp. 12, bibl. 14, 10 cents.  
Observations near Wenatchee, Wash., on the tree hopper, *Heliria praealta*, in 1929-34. In this district it feeds on and lays its eggs almost exclusively on the apple tree. It has been found rarely on cherry, prune, poplar, and once on wild chokecherry. It is at present of only secondary importance.
452. SINGH, R. N. 634.11-2.76  
The life-history, biology and ecology of the apple root borer, *Lophosternus hugelii* Redtembach, in Kumaun.  
*Indian J. agric. Sci.*, 1942, 11: 925-39, bibl. 7.  
*Lophosternus hugelii* is a serious pest attacking in some cases nearly 40% of the apple trees in the orchards of Almora and Naini Tal districts. In the North India hills it extends to an altitude of 7,000 ft. Fruit trees other than apple are seldom damaged, though in captivity the borer will feed on a variety of fruit and other tree roots. Only the thick roots are attacked, beginning near the base of the tree at a depth of 4-8 in. The attacked root is usually cut off at the base. Should the grub leave a root it moves very slowly in the soil at the rate of about 4 inches a month and, having no food direction sense, not necessarily towards another root. If it fails to meet another root within 3 months it dies. The female beetle will lay about 300 eggs and the larval stage lasts about 3½ years. Control measures are not discussed, though it is mentioned that digging or hoeing is ineffective in destroying either eggs or young grubs.



453. HANF, M. 634.75-2.76  
Versuche zur Bekämpfung des Erdbeerstengelstechers (*Rhynchites germanicus* Hbst.) im Rheingau. (The control of Minute Rhynchites of strawberry.)  
*Gartenbauwiss.*, 1940, 14: 671-96.  
The use of derris and pyrethrum-derris powder preparations is recommended as a control measure for Minute Rhynchites of strawberry.
454. STEINER, H. M., AND WORTHLEY, H. N. 632.78: 634.11  
The pistol case-bearer (*Coleophora malivorella*) and its control in Pennsylvania orchards.  
*Bull. Pa. agric. Exp. Stat.* 406, 1941, pp. 26, bibl. 9.  
Among sprays compared in tests reported here two early applications of cubé powder killed more than 95% of the larvae of the pistol case-bearer. Results with a large number of different treatments are noted.
455. WINGO, C. W. 632.78: 634.1/2  
The oriental fruit moth (*Grapholitha molesta*) in Missouri.  
*Bull. Mo. agric. Exp. Stat.* 424, 1941, pp. 15.  
Results of 3 years experimental spraying and dusting tests in Missouri indicate that oil-sulphur dusts and oil-nicotine sprays will materially increase the amount of clean fruit at harvest. Recommendations are made for the use of these and of fixed nictines, and for hygiene in the field and packing shed.
456. LAWREY, V. L. 632.78  
Codling moth control. Value of banding.  
*J. Dep. Agric. Vict.*, 1941, 39: 591-2.  
Trunk bands cut from old sacks, single thickness, 2-3 inches wide, attract 3 times as many codling grubs as the chemically treated corrugated cardboard band. Though bag bands require inspection every 10 days, while the chemical band does its own killing, the improved performance of the former makes its use worth while. Leaving the band on the tree the whole year round is advised except in orchards where there is red spider. In this case large quantities of their eggs will be deposited under the bands, which should be removed prior to spraying.
457. NEL, R. I. 632.78: 634.13  
Varietal interplanting in relation to control of the codling moth.  
*J. ent. Soc. A. Afr.*, 1941, 4: 111-33, bibl. 26.  
Differences between pear varieties with respect to time and extent of codling moth infestation and larval production and the more important factors determining these were examined both in the literature and practically in two orchards of different varietal composition in S. Africa. For the latter the banding method was used. The main factors influencing varietal infestation are the seasonal level of codling moth infestation and larval production in the orchards, the time and period of availability of fruit, varietal attractiveness for egg-laying and varietal resistance to infestation. The restricted interplanting of varieties is advocated, the ideal types being those which combine late blossoming with early ripening and show a high degree of resistance to larval entry. In such orchards the greater part of the normal first brood attack will be evaded, the overwintering population of larvae will be small and subject to heavy mortality and the population of spring moths will not be great. Even in orchards restricted to late ripening varieties, the degree of infestation will apparently be less than in the same varieties in mixed orchards. Certain objections to restricted varietal planting, namely, reduced chances of cross-pollination, lack of succession of fruit and the shorter harvesting season are considered and demolished. Control by spraying will have increased effectiveness for reasons that are stated and a reduction in the number of sprayings may be possible.
458. BARNES, H. F., AND WEIL, J. W. 632.64  
Baiting slugs using metaldehyde mixed with various substances.  
*Ann. appl. Biol.*, 1942, 29: 56-68, bibl. 19.  
A comparison of the number of slugs caught by 44 substances and by bran in metaldehyde baits shows that baits containing feeding stuffs are undoubtedly better than baits of metaldehyde alone or of metaldehyde mixed with non-feeding stuffs such as sand or soil. Cakes and meals are better than roughage foods such as bran. It is suggested that a large population of slugs can be greatly reduced by a single application of metaldehyde plus feeding stuff and can subsequently be kept in check by metaldehyde and an inert or non-feeding stuff diluent.
459. HOWARD, F. L. 632.411: 632.96  
Antidoting toxin of *Phytophthora cactorum* as a means of plant disease control.  
*Science*, 1941, 94: 345.  
The toxin of *Phytophthora cactorum*, which causes wilting in many plants and bleeding canker in hardwood trees, can be inactivated by the addition to the filtrate of 0.5% aqueous solution of the di-hydro-chloride salt of di-amino-azobenzene plus a solvent and penetrant (helione orange). More than 350 maple trees naturally infected by the fungus, on being injected with this antidoting chemical, subsequently stopped bleeding and showed marked improvement in vegetative growth.
460. HERMAN, F. A., AND MACEachern, C. R. 632.95  
Spray waters—composition and possible effect on spray mixtures.  
*Seventy-seventh A.R. Nova Scotia Fruitgrs' Ass.* for 1940, 1941, pp. 50-3.  
It is found that when heavy spray applications are made with hard water, the effect may be the liberation of water-soluble arsenic in sufficient amount to injure the foliage and produce russetting of the fruit. The reaction of the water may have a bearing on spray troubles. Thus acid waters, pH less than 7.0, may tend to have a solvent action on some of the chemicals in the spray. Observations are recorded on arsenic breakdown using different samples of water.
461. WIESMANN, R. 632.951.23: 634.1/7  
Ersatzstoffe für die Arsenmittel im Pflanzenschutz. I. Versuche mit Phenothiazin, Schwefelstickstoff und Sporein im Obstbau. (Substitutes for arsenicals in pest control. Trials with phenothiazin,  $N_4S_4$  and Sporein in the orchard.)  
*Landw. Jb. Schweiz.*, 1941, 55: 657-75, bibl. 22.  
 $N_4S_4$  proved useless against caterpillars of *Cheimatobia brumata* and other moths and was definitely harmful to vegetation. Phenothiazin was effective when freshly sprayed but it very quickly lost its effect in the open. Sporein, a bacterial preparation of Metchnikoff, proved very effective against caterpillars for a few days only, after which it lost all its power.
462. WERKMAN, C. H., AND WOOD, H. G. 576.85  
On the metabolism of bacteria.  
*Bot. Rev.*, 1941, 8: 1-68, bibl. 219.  
RIKER, A. J., LYNEIS, M. M., AND LOCKE, S. B. 632.314  
Comparative physiology of crown gall, attenuated crown gall, radiobacter and hairy root bacteria.  
*Phytopathology*, 1941, 31: 964-77, bibl. 14.  
SCHMIDT, M. 632.42: 634.11  
*Venturia inaequalis* (Cooke) Aderhold. X. Zur Vererbung der morphologischen Merkmale auf künstlichem Substrat und der Aggressivität gegenüber bestimmten Wirten bei Einsporenherkünften des Apfelschorfpilzes. (The inheritance of morphological characters on artificial medium and the virulence in particular hosts of the apple scab fungus raised in single spore cultures.)  
*Gartenbauwiss.*, 1940, 15: 118-39, from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 11.



- KEITT, G. W., AND LANGFORD, M. H. 632.42: 634.11  
*Venturia inaequalis* (Cke) Wint. I. A groundwork for genetic studies.  
*Amer. J. Bot.*, 1941, 28: 805-20, bibl. 39.
- RITCHER, P. O., VALLEAU, W. D., AND MAGILL, W. W. 632.3/7: 634.1/7  
 Fruit pests and their control.  
*Bull. Ky agric. Exp. Stat.* 393, 1939, pp. 121-79.  
 Includes diseases as well as pests.
- FILINGER, G. A. 632.3/7: 634.1/7  
 Combating fruit pests in Kansas.  
*Circ. Kans. agric. Exp. Stat.* 199, 1940, pp. 45.  
 Includes diseases as well as pests.
- BIOLOGISCHE REICHESANSTALT FÜR LAND- U. FORSTWIRTSCHAFT, BERLIN. 632.6/7: 634.1/8 + 635.1/7  
*Anleitung zur Bestimmung und Bewertung der wichtigsten Schädigungen der Kulturpflanzen. II. Gemüse- und Obstbau.* (Introduction to the determination and appreciation of the most important pests of cultivated plants. II. Vegetable and fruit growing.)  
 3rd edition, Berlin, 1939, pp. 92, 57 illustrations.  
 Reviewed *Forschungsdienst*, 1940, Vol. 10, abstr. p. 142.
- MIDDLEKAUFF, W. W. AND HANSBERRY, R. 632.77: 634.11 + 634.23  
 Toxicological studies with adults of apple maggot and cherry fruitflies (*Rhagoletis* spp.)  
*J. econ. Ent.*, 1941, 34: 625-30, bibl. 5.
- MIDDLEKAUFF, W. W. 632.77: 634.11 + 634.23  
 Some biological observations of the adults of the apple maggot and the cherry fruitflies (*Rhagoletis* spp.)  
*J. econ. Ent.*, 1941, 34: 621-4, bibl. 7.
- CARRICK, R. 632.64  
 The grey field slug *Agriolimax agrestis* L. and its environment.  
*Ann. appl. Biol.*, 1942, 29: 43-55, bibl. 11.
- NORTON, L. B., AND BILLINGS, O. B. 632.951.1  
 Characteristics of different types of nicotine sprays. I. Nicotine residues.  
*J. econ. Ent.*, 1941, 34: 630-5, bibl. 2.
- HANSBERRY, R. 632.951.1: 632.78  
 Characteristics of different types of nicotine sprays. II. Codling moth control.  
*J. econ. Ent.*, 1941, 34: 636-8.
- CHAPMAN, P. J., PEARCE, G. W., and AVENS, A. W. 634.11-2.782  
 The use of petroleum oils as insecticides. III. Oil deposit and the control of fruit tree leaf roller (*Cacoecia argyrospila*) and other apple pests.  
*J. econ. Ent.*, 1941, 34: 639-47, bibl. 3.
- KARR, E. H. 634.11-2.951  
 Experiments with several wetting agents in the removal of fluorine spray residue from apples sprayed with a natural cryolite.  
*J. econ. Ent.*, 1941, 34: 676-84, bibl. 19.
- WHITTEN, R. R., POTTS, S. F., AND FRANCIS, E. H. 632.78: 656.7  
 Concentrated spray applied with an autogiro for control of canker worms [*Paleacrita vernata* and *Alsophila pometaria*].  
*J. econ. Ent.*, 1941, 34: 692-6, bibl. 4.
- SIEGLER, E. H., AND SMITH, L. E. 632.78  
 Toxicity to the codling moth larva of phenothiazine prepared with allotropic forms of sulphur.  
*J. econ. Ent.*, 1941, 34: 727, bibl. 2.  
 The form of sulphur used did not affect the toxicity of the phenothiazine.
- FINNEY, D. J. 632.951  
 The analysis of toxicity tests on mixtures of poisons.  
*Ann. appl. Biol.*, 1942, 29: 82-94, bibl. 10.
- MARTIN, J. T. 632.951.1  
 The problem of the evaluation of rotenone-containing plants. VI. The toxicity of *l*-elliptone and of poisons applied jointly, with further observations on the rotenone equivalent method of assessing the toxicity of derris root.  
*Ann. appl. Biol.*, 1942, 29: 69-81, bibl. 15.
- TEMPLETON, JR. W. C., AND RITCHER, P. O. 632.954  
 Dandelion control with dichloroethyl ether.  
*J. Amer. Soc. Agron.*, 1942, 34: 283-4.
- MAINE AGRICULTURAL EXPERIMENT STATION. 631.531 + 632.952 + 632.951  
*Official inspection 174. Commercial Agricultural Seeds 1939 and Fungicides and Insecticides 1939*, 1939, pp. 99-133.

## VEGETABLES, HERBS AND STIMULANTS.

463. THOMAS, P. H. 635.1/7: 631.531  
 Production and selection of vegetable seeds.  
*Tasm. J. Agric.*, 1941, 12: 142-4.  
 Experiments are given for the home production of vegetable seeds in Tasmania. The following are dealt with:—beans, peas, tomatoes, lettuce, pumpkins, cucumbers, melons, brassicas, onions, parsnips, beets, carrots, turnips, spinach. Notes on storage are included. The article provides opportune information for present wartime conditions.
464. HÖFLER, K., MIGSCH, H., AND ROTTENBURG, W. 632.112  
 Über die Austrocknungsresistenz landwirtschaftlicher Kulturpflanzen. (Drought resistance of agricultural plants.)  
*Forschungsdienst*, 1941, 12: 50-61, bibl. 35.  
 Experiments were made in the trial grounds of the Plant Physiology Institute at Augarten in 1939 to determine the drought resistance of some 30 cultivated plants, mainly vegetables, and results are tabulated and discussed with regard to the general principles indicated by them. The exact degree of water deficiency necessary to obviate any subsequent recovery following the addition of water was determined in all cases.
465. SCHUPHAN, W. 635.1/7: 631.811.8  
 Die Bedeutung der Chloridernährung für die Pflanze, insbesondere für Gemüse. (The importance of chloride nutrition to plants, in particular vegetables.)  
*Forschungsdienst*, 1941, 11: 161-76, bibl. 107.  
 Among the points which the author's survey of the literature underlines are the following:—1. What we find in seaside plants is not so much a definite need for as a greater tolerance of NaCl. Cultivated plants derived from them might be classified as facultative halophytes. They show a preference for chlorides in fertilizer trials. 2. The following vegetable species count as chlorine loving plants: celery and carrot, mangold, spinach and asparagus. Potato and tomato, bush bean, radish and onion can be considered as chlorophobes. Beetroot and peas hold an intermediate position. 3. The chlorine ion has a stimulating effect on the physiology and visible development of the plant. The presence in the soil of NaCl at a strength of only 0.1 to 0.25% may check



growth. Damage to plants can be caused by the presence of 0.1% NaCl in water. A favourable effect on germination was found to be produced by 0.4 to 1.0% NaCl solutions. 4. From NaCl solution the Cl is absorbed more quickly than the Na ion. The speed of absorption of the K and Cl ions in a KCl solution is about the same, while in  $K_2SO_4$  solutions the K is absorbed more quickly than the  $SO_4$ . 5. The chlorine ion causes important morphological and physiological changes in plants. Thus roots are lengthened, leaves are shortened and become dark or blue-green in colour. The leaves often exhibit xeromorphic features. Considerable changes occur in metabolism. 6. The effects of chloride fertilizers differ yearly according to the weather. Their water economizing effect must be of more than a little importance on soils of poor water-holding capacity or unfavourable precipitation. 7. In K deficiency we are faced with reduced capacity for assimilation coupled with simultaneous increased respiration. The want of the K ion and its good effect on the hydration of the plant cell activates starch-hydrolyzing ferments. An accumulation of soluble carbohydrates with simultaneous disappearance of starch is the result. Increased N content with a parallel rise in non-protein N compounds, an unfavourable water balance and such consequences as increased content of dry matter and appreciable fall in crop are further marks of K deficiency.

466. GERICKE, S. 635.1/7: 631.85  
Die Wirkung der Phosphorsäuredüngung bei  
Gemüse. (The effect of phosphatic manuring of  
vegetables.)  
*Gartenbauwiss.*, 1940, 15: 159-83.

The value of phosphoric acid manuring in increasing yield and quality in such vegetables as cabbage, cauliflower, lettuce, spinach, carrots, beetroot, radish, onions, leeks, celery, beans, peas, cucumbers, vegetable marrow, tomatoes and asparagus is shown by a number of manual experiments.

467. GREEN, D. E. 635.1/7: 632.3/4  
Hygiene in the wartime vegetable garden. XI-  
XIV.\*  
*J. roy. hort. Soc.*, 1942, 67: 33-9, 62-8, 97-102,  
136-42.

Part XI deals with the diseases of turnip and swede, namely clubroot, black rot, soft and dry rots, powdery and downy mildews, leaf spots, white blister, scab, virus, cracking, brown heart, storage rots and damping off. Diseases of radish, kohlrabi and Hamburg parsley, the latter a palatable substitute for parsnip, are briefly mentioned. In Part XII the many diseases of beetroot and of sugar, seakale and spinach beet are reviewed. In Part XIII the diseases discussed are those of Swiss chard, sweet corn, seakale, chicory, Jerusalem artichoke, asparagus and rhubarb. Part XIV.—This article ends the series and deals with the diseases of horse radish, mushrooms, mint and peppermint, parsley, sage, thyme (having none worth mentioning), cress and watercress.

468. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE,  
U.S. DEP. AGRICULTURE. 632.7  
Gladiolus thrips (*Taeniothrips simplex*), striped  
cucumber beetle (*Diabrotica vittata*), potato leaf  
hopper (*Empoasca fabae*), imported cabbage worm  
(*Pieris rapae*).  
Picture Sheets 6, 7, 8 and 9 respectively, 1941,  
2 pages each, 5 cents.

Each insect is illustrated in colour and its habits and control are briefly discussed.

469. PEARSON, A. 632.51  
Field bindweed or wild Morning Glory. A menace  
to irrigated areas.  
*Agric. Gaz. N.S.W.*, 1942, 53: 15-6, bibl. 1.

This weed, *Convolvulus arvensis*, can be killed out by constant

\* For notes on other parts see *H.A.*, 11: 96, 443, 813, 1211; and 12: 147.

cultivations. The Kansas State Board of Agriculture advise cutting the weed by cultivation once every two weeks, 3 to 5 inches below the surface. It may not be possible to complete destruction in one year.

470. JACOB, W. C., AND WHITE-STEVENS, R. H.  
635.61: 631.83+546.27+631.811.6

Studies in the minor element nutrition of vegetable  
crop plants. II. The interrelation of potash, boron  
and magnesium upon the flavor and sugar content of  
melons.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39:  
369-74, bibl. 11.

In these experiments at Selden, N. York, the melon used was Delicious. The most consistent effect found by each of the five methods tested was the distinctly negative potash effect, which extended into all interactions involving potash. Magnesium on the other hand showed a consistent stimulating effect on flavour, total dispersed solids and sugar concentration. When magnesium interacted with boron a negative effect was produced which indicated that each element inhibited the beneficial effects of the other. Boron on the whole showed a reducing effect but tended to increase sucrose at the expense of the hexose and also showed a distinct neutralizing effect on the deleterious potash effect.

471. WHITE-STEVENS, R. H. 635.1/7: 546.27  
Limits in the use of borax in the production of  
certain vegetable crops.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 367.

LORENZ, O. A. 635.11:546.27  
The relation between boron and calcium in the  
growth of garden beets.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39:  
368.

These two papers are abstracts of papers which will be published by Cornell University.

472. SKOK, J. 546.27: 635.15  
Effect of boron on growth and development of the  
radish.

*Bot. Gaz.*, 1941, 103: 280-94, bibl. 33.

The experiments here described in considerable detail were planned to study the gross boron deficiency symptoms of the radish, the effect of photoperiod on the manifestation of those symptoms, and the histological effects of boron deficiency on the radish.

473. AVANZI, E. 633.491  
Schema per la classificazione delle varietà di  
patate. (A classification scheme for Italian  
potatoes.)

*Ital. agric.*, 1942, 79: 80-95.

The author gives a preliminary classification if Italian potatoes into 15 groups differentiated according to the following characters:—shape of tuber, colour of flesh, type and colour of skin, number and position of eyes, type and colour of bud, colour of flower.

474. TINLEY, N. L., AND BRYANT, D. M.

The relation between size of potato and planting  
distance.

Reprinted from *J. S.E. agric. Coll. Wye*, No. 44,  
1939, pp. 120-33, bibl. 9.

*Great Scot.* Large sets produced a higher total yield, yield of ware and seed than any other type of set. When the cost of seed was deducted from the gross returns per acre the most profitable return was obtained from the 21 inch spacing owing to the smaller amount of seed required. On the basis of profit 18-21 inch spacing is recommended for cut sets, 21 inch for normal sets, 12 to 15 inch for chats. *King Edward*. The most profitable planting distances in the rows were—for large sets, 21 inches; cut sets, 12 inches; normal sets, 12 inches; chats, 12 inches. Cost of earthing,

labour in planting and railfreight of seed were not considered. With both varieties 12 inch planting of any type of seed, rows 27 inches apart, produced a larger total yield of ware and seed than any other planting distance.

475. ASDONK, T., AND JACOB, A. 631.83  
Zusammenfassung der Ergebnisse der in den Jahren 1935 bis 1938 durchgeführten Kalidüngungsversuche . . . (A summary of results of potassium fertilizer trials on potatoes made in the years 1935 to 1938.)  
*Bodenk. u. PflErnähr.*, 1940, 20: 107-23, from abstract *Forschungsdienst*, 1940, Vol. 10, abstr. p. 140.

In these trials of the German Potash Syndicate the average increase in crop due to 1 kg.  $K_2O$  amounted to 19.2 kg. starch. Increasing the potash manuring up to 160 kg.  $K_2O$  per hectare did not result in any phenomenon suggesting the working of the law of diminishing returns. Patent potash and sulphate of potash were superior to muriate of potash as regards starch production. The pH of the soil did not seem to affect results. In early varieties the chief result of applying potash was to increase the amount of starch. Time of application was found to be particularly important especially for starch production.

476. GERICKE, S. 633.491-1.85  
Die Phosphorsäuredüngung der Kartoffel.  
(Phosphatic manuring of potatoes.)  
*Forschungsdienst*, 1941, 11: 641-5, bibl. 17.

A strong plea, based on the experimental results of many workers, for the greater use of phosphatic fertilizers for potatoes. Trials show that not only quantity but also quality, as affecting both culinary and industrial use, is improved by the addition of phosphates.

477. HEINZE, K. 633.491-2.753: 634.21 + 634.25  
Die Entwicklung des Pfirsich- und Aprikosenanbaus in Deutschland bis zum Jahre 1938 als Ursache für die allmähliche Zunahme der Kartoffelvirosen. (The spread of peach and apricot growing in Germany up to 1938 as a reason of the gradual increase in potato viruses.)  
*Forschungsdienst*, 1940, 11: 50-9, bibl. 10.

The author shows how the increased growth of peach or apricot trees in different parts of Germany has resulted in the provision of a suitable winter host for *Myzodes persicae*, a vector of potato viruses, with consequent serious increase in potato virus infection. The suggestion is made that the cultivation of peach and apricot shall be restricted in certain areas and that in all cases winter washing control methods shall be adopted to keep the aphid down.

478. KASSANIS, B. 633.491-2.8-2.753  
Transmission of potato virus Y by *Aphis rhamni* (Boyer).  
*Ann. appl. Biol.*, 1942, 29: 95, bibl. 3.

In the glasshouse *Aphis rhamni* proved no less efficient a potato virus vector than *Myzus persicae*.

479. BRENTZEL, W. E. 633.491-2.48  
Treatment removes *Rhizoctonia* from potato tubers.  
*Amer. Potato J.*, 1942, 19: 16-7.

Washing potato tubers in a solution of chlorinated lime followed by a light brushing in water was efficacious in removing *Rhizoctonia* and in improving the appearance of marketable potatoes. It may also prove useful as a disinfectant for table stock potatoes, as a preventive against decay of tubers in transit and storage and in preventing the dissemination of bacterial ring rot and other diseases from seed stock. The treatments which proved successful were soaking the tubers for 15 hours in a cold 5% solution of commercial chlorinated lime (24% available chlorine), for 6 hours in a 10% cold solution or for 1 hour in 5% solution at 100° F. Experiments are proceeding at the Agricultural Experiment Station, Fargo, North Dakota.

480. LOUGHNANE, J. B. 633.491-2.8  
The susceptibility to leaf roll of certain potato varieties and its effect on their yield.  
*J. Dep. Agric. Eire*, 1941, 38: 48-67, bibl. 7.

GLÖCKNER, G. 633.491-2.8  
Untersuchungen über die "Sang"-Krankheit der Kartoffeln im Rheingau. (Investigations into a wilt (scorch) disease of the potato in the Rhineland.)  
*Forschungsdienst*, 1941, 11: 388-91, bibl. 4.

BONDE, R. 633.491-2.314  
Bacterial wilt and soft rot of the potato in Maine.  
*Bull. Me agric. Exp. Stat.* 396, 1939, pp. 675-94, bibl. 11.

481. BELL, G. H. D., AND BAUER, A. B. 612.014.44: 633.63  
Experiments on growing sugar beet under continuous illumination.  
*J. agric. Sci.*, 1942, 32: 112-41, bibl. 12.

In trials at Cambridge growing young sugar beets under continuous illumination before transplanting into the field induced stem elongation and anthesis in considerably greater proportions than in plants not under continuous light. The technique used during the winter months offers a means of rapid multiplication of small seed stocks and also of isolating the various physiological types comprising the population. In particular the technique should make it possible to select types resistant to bolting. Certain deductions can be made from an analysis of the glomerule populations which should be of value to the breeder and grower. These are discussed. [From authors' summary.]

482. FRASER, H. 633.822-2.452  
Warm-water treatment for mint rust.  
*Gdnrs' Chron.*, 1942, 111: 59.

The teleutospore stage of mint rust can be successfully controlled by immersion in hot water at 105°-115° F. for 10 minutes. Before and after immersion the runners should be well hosed. Treatment will result in much stronger growth for which allowance should be made in replanting. There is no satisfactory control for its summer stage.

483. SEN, B., AND CHAKRAVARTI, S. C. 581.143.26.03: 633.844  
Vernalization of mustard.  
*Nature*, 1942, 149: 139-40, bibl. 4.

Results obtained in India from the vernalization of mustard, *Brassica juncea*, in particular Type 27, are described. Maximum vernalization was produced in unsplit seeds when chilled for 6 weeks, prolongation of the chilling period up to 365 days having no further effect in vernalization or devernization. Unlike winter wheat unsplit mustard, if dried after vernalization, suffered no devernization even after drying for 725 days. From this and from similar results obtained by others with winter rye it appears that when the growth of the embryo is confined within the elastic limit of the seed coat chilled seed can be dried without devernization resulting. The following deductions were also made for reasons which are stated. (1) Mustard Type 27 has no obligatory low temperature requirements for the first phase of development; (2) it flowers under photo-periods of 10 hrs. and 16 hrs., but significantly earlier (both control and V-plants) with increase of photo-period from 10 hrs. to 13 hrs. for the initial 3 weeks; (3) within limits the effect of low temperature during the first phase of development and of increased photo-period during the second phase in shortening the vegetative period of mustard is of a quantitative nature. Under similar temperature ranges V-plants under photo-period of 10 hrs. and control plants under photo-period of 13 hrs. or more have similar vegetative periods. V-effects were not transmitted to the offspring of three successive vernalized generations but low temperature during seed ripening produced partly vernalized seed.



484. WILSON, J. 635.1/7: 631.544  
Some methods of protecting and forwarding salad  
and other vegetable crops.  
*J. roy. hort. Soc.*, 1942, 67: 24-7.

New methods are suggested for the protection of early garden crops. To carry these out only material available in most gardens or none at all is required, but a certain amount of digging will be necessary in some cases.

485. MAHER, F. A., AND HYAM, G. N. 635.25: 631.531.13

**Harvesting onion seed.**

*J. Dep. Agric. Vict.*, 1942, 40: 1-3.

The flower head of the onion is described. The head is ready to harvest when approximately a quarter of the seed pods have dried out and have begun to break open, exposing the black seeds, and when the flower stem tends to become yellowish. The blackness of the seed is an unreliable guide. Correct timing of picking is all-important. If left too long there is loss from shattered capsules; if taken too soon shrivelling and poor viability will result. Several pickings will be necessary for the heads do not all ripen simultaneously. The head is cut with 8 or 9 inches of stem attached which allows any partially ripened seed to mature during curing. After cutting the head is kept upright until placed in a container in order to prevent loss from open capsules. Curing is effected by packing the heads loosely into sacks of loose texture. Tight packing causes sweating. The filled bags are hung over a wire fence or from the rafters of a shed. The completion of curing is indicated by the easy shedding of the seed and the brittleness of the stem. Threshing can be done on any machine fitted with a peg drum, by flailing or by beating or trampling the heads in the curing bags or, in the case of small quantities, rubbing by hand through sieves. Threshed seed is passed mechanically or by hand through No. 4 or No. 6 mesh sieves. Winnowing is done by machine, by fanning or by exposure to moderate wind. Finally the seed is either machine-dressed or, if in small quantities, is stirred in water for a few minutes. On cessation the sound seed will sink and the floating debris can be skimmed off. The sound seed is then immediately spread out in the open to dry on boards or iron sheets. Commercial viability (at least 50% under the Victorian Seeds Acts) will last for about one year.

486. ANON. 635.25  
**Bulb onions in 1942. A review and its lessons.**  
*Fruitgrower*, 1942, 93: 137.

The onion season of 1941 in England was disastrous. Requirements for growing storage onions are few but essential. *Soil.* The soil must be friable, of fine tilth and well supplied with humus from dunging in previous years. Deep cultivation is a help. *Labour.* Adequate labour for hand weeding is necessary and at the proper time for harvesting, sorting and storing. *Storage.* Weather conditions for ripening off on the ground are rarely suitable, hence, unless the crop can be immediately sold, accommodation for drying off and subsequent storage must be available. Drying off can be well done in a greenhouse with slatted staging, the onions being laid on it not more than two deep. Long storage should be on racks or trays with wire bottoms stacked in a dry, well-ventilated building from which light is excluded. Storage in heaps or bags means heavy loss. By raising in boxes in heat and planting out in April it is suggested that a heavy crop can be almost certainly obtained with a saving of two weedings, avoiding thinning and reducing the risk of attack by fly mildew.

487. WOOD, J. 635.25: 632.6/7  
**Notes on onion pests.**  
*Kirton agric. J.*, 1942, No. 8, pp. 5, 7.

The wireworm has proved a serious pest of onions on newly ploughed grassland in some districts but it is not one that will persist more than a few years if the ground is properly

cultivated. With increased areas under onions specific pests such as eelworm and onion fly are likely to become of primary importance. Eelworm can only be avoided by planting on non-infested land. There is no remedy once an attack has begun. Onion fly is dealt with by mixing the seed with an equal weight of calomel in a small quantity of thinned flour paste, stirring till each seed is coated. Or the young plants may be dusted with a 4% calomel dust when they have reached the loop stage and again 10 days later. These treatments are preventives, not cures, and must be used with precision.

488. ANON. 635.261  
**The Egyptian leek.**  
*Market Gr.*, 1942, 19: 24: 3.

The possibilities of the Egyptian leek as a crop for Great Britain is discussed. There are two types, one being grown for the leaves only, the other for its long blanched stem and bulbous base. The leafy type will probably be unsuitable as the leaves bruise on packing. The stem type should prove an acquisition. It is more vigorous than the English leek, with a greater stem length and a swollen root, while the flavour is excellent. Spacing in the field should be 15 inches. It is not hardy enough to stand later than November. Sow in March in a temperature of 60-65° F. and harden off for planting out by middle to end of May. The writer mentions that although ordinary leeks suffered much from white leaf tip disease his Egyptian leeks were unaffected.

489. NICOLAISEN, N., AND OTHERS. 635.31  
**Ergebnisse deutscher Versuchsarbeit zu Spargel.**  
**(The results of German investigations on asparagus.)**  
*Landw. Jb.*, 1940, 90: 430-94, from abstract  
*Forschungsdienst*, 1941, Vol. 12, abstr. p. 10.

A full account of every phase of investigational work in Germany on the cultivation and storage of asparagus.

490. WOLF, J. 635.31: 577.16  
**Untersuchungen an Spargel. I. Ascorbinsäure.**  
**(Vitamin C in asparagus.)**  
*Gartenbauwiss.*, 1940, 15: 109-17.

A study of the distribution of anti-scorbutic acid in the stem of the asparagus, as grown for market, in the white and green shoots and the changes brought about by storage. The anti-scorbutic acid content is greatest in the tip of the shoot and greater in the skin than in the inner portions. It is also highest in the green shoots. Storage at various temperatures reduced it only slightly.

491. WOLF, J. 635.31: 577.16  
**Untersuchungen an Spargel. II. Mitteilung:**  
**Vitamin C. (Asparagus investigation. 2nd**  
**report, Vitamin C.)**  
*Gartenbauwiss.*, 1941, 15: 590-8.

Experiments were made on the loss in vitamin C from different parts of white asparagus when stored at temperatures of +20, +13.5 and -0.5° C. The results showed that after 3 weeks at -0.5° C. the tips, richest in vitamin C, had lost 75% of their vitamin C content, the middle portions 35% and the ends 38%. At +13.5° C. the tip had lost 60% in 6 days and the other parts 50%. At +20° C. the loss in the tips was 38% in 48 hrs., in the middle parts 16% and in the ends 30%.

492. REID, W. J., AND OTHERS. 635.34: 632.78  
**Field studies of insecticides used to control cabbage caterpillars in the South.**  
*Tech. Bull. U.S. Dep. Agric.* 782, 1941, pp. 35, bibl. 5, 10 cents.

The results of experiments at Charleston, S. Carolina, and Baton Rouge, Louisiana, from 1932/33 to the spring of 1935 inclusive. The evidence, which is considered in detail, indicates that a derris dust mixture containing 0.5 to 1.0% of rotenone is sufficiently toxic to each species of important cabbage caterpillar in the South, with the exception of the

*Agrotinae*, to be of value as a substitute for arsenicals in practical field control. Other substances were not found so good.

493. REID, W. J., AND OTHERS. 635.34: 632.78  
Studies on the control of cabbage caterpillars with derris in the South.  
*Circ. U.S. Dep. Agric.* 615, 1942, pp. 26, bibl. 11, 10 cents.

Tests were made of a derris clay dust mixture containing 0.5% of rotenone applied at the rate of 6 to 24 lb. per acre on cabbage caterpillars at Baton Rouge, Louisiana, and Charleston, S. Carolina, in the years 1935 to 1937. Increases in yield resulted from the application of some of the treatments, but in general there was indication of a need for further study to determine whether derris dusts containing a higher rotenone content or applied more frequently, with a corresponding increase in cost, could be used profitably.

494. SCHINDLER, H. 635.348  
Regenerationsversuche an Kohlrabi und ihre Bedeutung für die Steigerung des Ertrages.  
(Methods of improving the kohlrabi crop.)  
*Gartenbauwiss.*, 1941, 15: 418-26.

Experiments with kohlrabi, *Brassica oleracea* f. *gongylodes*, showed the removal of the top of a grown plant or the application of a slanting or wedge-shaped cut leads to regeneration, giving several new shoots each as large as the original plant. Similar results were obtained with *B. oleracea*, f. *capitata* and f. *sabauda*.

495. THOMPSON, J. K., AND THOMPSON, F. C. 635.35: 631.8  
A note on the manuring of early cauliflowers.

*Kirton agric. J.*, 1942, No. 8, pp. 15.  
Recommendations on the manuring of cauliflowers have seldom been supported by experimental evidence. Trials, therefore, were carried out on silt loam at Kirton in 1937, '38 and '39. N, P and K were applied in all combinations with a no artificial control. All crops received a dressing of farm yard manure. The quantities of artificials per acre were, sulphate of ammonia 3 cwt. in 2 dressings of 1½ cwt. with a month's interval, superphosphate 6 cwt., sulphate of potash 2 cwt., P, K and 1 dressing of N were applied immediately before planting and worked in. The cauliflowers were grown after peas, cauliflowers, and potatoes in successive years. The large amount of data obtained has not all been statistically examined, but it appears that with early summer cauliflower grown on land in a high state of fertility N alone is likely to prove of value, and this because of increased earliness in reaching maturity rather than on increase of total weight produced.

496. JACOB, W. C., AND WHITE-STEVENS, R. H. 635.35+635.36  
"Starter" solutions in the production of cauliflower and brussels sprouts on Long Island.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 349-50.

Results at the Vegetable Research Farm, Riverhead, New York, indicate that given good conditions of fertility no advantage is to be gained by adding minerals or growth substances to the water given on transplanting cauliflowers and brussels sprouts.

497. BEVAN, W. H. C. 635.52  
Lettuces in pots.  
*Gdnrs' Chron.*, 1942, 111: 60.

A new and very successful method of growing lettuces under glass in pots is described. The seed was sown in September, the seedlings pricked out when large enough into boxes and kept in well aired cold frames for from 4 to 6 weeks, when they were transferred singly to 5-inch pots. The pots were removed to greenhouses 4 to 6 weeks later. By varying temperatures, 45° to 60° F. in different houses, a staggering

of maturity was obtained. Good ventilation is necessary and water must not touch the foliage. The usual precautions of partial soil sterilization and the use of Cheshunt compound against damping off were observed. The best variety was Cheshunt Giant. Gotte-a-forcer is suitable also though small for market work. It withstands a higher temperature than Cheshunt Giant. Forcing Milly was not successful. The crop was easily sold in December and January at good prices.

498. GRIFFITHS, A. E. 635.52: 631.8  
Studies of the response of lettuce to manure and commercial fertilizers.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 351-6, bibl. 5.

Data of lettuce trials in the University of Arizona farm at Mesa, showing an average pH of soil 8.0, indicate that in general the simple inorganic sources of plant nutrients gave the best results on the manured plots and that fertilizers in which part of the N was contributed from organic sources gave the best results on non-manured plots.

499. BRENCHELY, W. E., AND WARINGTON, K. 635.52: 547.25.77  
Value of molybdenum for lettuce.

*Nature*, 1942, 149: 196.  
Working at Rothamsted on the minor element constituents of Chilean nitrate the authors have noted the value of molybdenum (in the form of sodium molybdate in ten million parts of nutrient solution) for improving the growth and health of lettuce. Preliminary trials even suggest that its presence may be able to fend off boron deficiency in the early stages of growth.

500. WEHLMANN, —. 635.52  
Gruppeneinteilung und Sortenmerkmale beim Kopfsalat. (Classification of varietal characters in lettuce.)  
*Gartenbauwiss.*, 1941, 15: 585-9.

501. ROUX, —. 635.54  
Ein Beitrag zur Erhöhung des Anbauerfolges der Treibzichorie. (Chicory forcing.)  
*Gartenbauwiss.*, 1941, 15: 559-64.

The author sets out to discover which form of chicory root is most suitable for forcing and what improvements could be made by breeding. The conclusion is reached that as the size of the root increases, so up to a certain point does the size of the shoot. Beyond that point, if larger roots are chosen there is a tendency to produce numbers of small and worthless shoots. The most suitable size of root is one measuring 4-5 cm.

502. ANON. 635.56  
Thick-leaved dandelions.  
*Market Gr.*, 1942, 19: 18: 3.

A recommendation that thick-leaved dandelion should be grown as a salad crop. The method advocated is to sow in trays and transplant when big enough to handle, at 10 inches apart to tomato borders midway between the positions that will be occupied by the plants, or they may be grown throughout in deepish boxes. There are no pests. The leaves before cutting are blanched by tying up when large enough into an erect bunch. They must then be kept dark for two weeks. So treated they have a ready sales value.

503. JENKINS, J. M. 635.63-2.42  
Downy mildew\* resistance in cucumbers.  
*J. Hered.*, 1942, 33: 35-8, bibl. 7.

Results of tests at Charleston, S. Carolina, of 80 varieties and strains of cucumber indicate that resistant and otherwise commercially desirable types of cucumbers may be isolated from crosses of either China or Puerto Rico No. 37 with good commercial varieties such as Colorado.

\* *Peronosporaplasmopara cubensis*.



504. GOODALL, D. W., AND BOLAS, B. D. 635.64: 581.143.26.03

The vernalization of tomato seed.

*Ann. appl. Biol.*, 1942, 29: 1-10, bibl. 13.

Tomato seeds (var. Potentate) were chilled in an imbibed state, but before germination, at temperatures of 0°, 2-3°, 7° and 8-11° C. for periods of 10 and 20 days; subsequently they were germinated, together with control seeds, in conditions both of restricted and of fully adequate moisture. The plants grown from chilled seeds produced more fruit, particularly during the first few weeks of cropping, than those from unchilled seeds. Also their first two leaves were opposite in a greater proportion of the instances; this effect was more marked after treatment at the higher temperatures. Both leaf area at a given date and fruit size during the first weeks of cropping were greater in the series germinated with a full moisture supply than in those with restricted moisture. The dates of first flowering and fruiting were not affected by the treatments. The temperature differences appear to have had little effect. [Authors' summary.]

505. JOHN INNES HORTICULTURAL INSTITUTION. 635.64

Growing tomatoes out of doors.

*John Innes Leaflet*, 5, 1942, pp. 6, 6d.

MATHER, K., AND CRANE, M. B. 635.64

The yields of tomato varieties in an outdoor trial.

*J. roy. hort. Soc.*, 1941, 67: 92-4.

Tomatoes grown out of doors in southern England should yield 7 lb. of fruit per plant and a vitamin C content twice that of indoor tomatoes. The leaflet describes the best method of cultivation. The best yielding varieties of 18 grown on the light loamy soil of Merton were Harbinger and Stonor's Exhibition. The two worst were Plumpton King and Buckley. Those showing the highest yield on 10 September, i.e. presumably the earliest to ripen, were Harbinger, Earliest of All and Hundredfold. The total yield of the two last, however, was 5.93 lb. and 6.36 lb. per plant respectively against the 7.08 lb. of Harbinger. There is a note on seed saving in which is pointed out the importance of selecting for seed the best plant and even truss. Twelve to fourteen pounds of fruit should yield 1 oz. of seed or 8,000 seedlings.

506. M., D. 635.64

Outdoor tomatoes. 1941 results in Devon.

*Fruitgrower*, 1942, 93: 42.

A report on outdoor tomatoes grown in a Devon nursery in 1941. The soil was dug one spit deep, the plants set out the third week in May and given a base manure (unspecified) when well established. They were strawed down 3 inches thick when the first truss appeared, stopped at the third truss on 10 July and had all leaves removed on 10 September. Three sprayings with an unspecified proprietary wash were given. The crop was a complete success. The fruit was picked as soon as the first sign of colouring appeared, ability to ripen off the vine being therefore an important factor. Another important point is to pick in the heat of the day when the fruit is warm. The fruit after picking was placed in shallow trays in a greenhouse and covered with paper, exposed the following day to full sunshine and again covered till the fruit was ripe. The performances of the different varieties are discussed.

507. CURRENCE, T. M. 635.64

The interactions between variety, spacing and staking of tomato plants.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 315-8.*

Staking and especially staking plus pruning seemed generally to increase fruit size. Spacing as close as 1 x 4 feet increased yields uniformly for all varieties and treatments under test

508. BRASHER, E. P. 635.64: 631.536  
A preliminary report on two plants versus one tomato plant per stake.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 329-31, bibl. 8.*

Trials at Morgantown, W. Va with Break O'Day tomatoes set singly and two plants to a stake, the stakes being 2 ft. apart in rows 4 ft. apart, showed a great increase in yield per acre, 15.58 as against 10.68 tons, in favour of the double planting.

509. WITTKORN, T. H. 635.64: 631.55

Two successful tomato picking machines.

*Market Gr. J.*, 1941, 69: 507, 517.

The machines, one of which is illustrated, consist of a 25 foot wide and 9 foot deep platform mounted on pneumatic tyred wheels at each end. The platform carries the empty baskets and beneath it 6 hammocks in which the pickers ride. Their job is to detach the fruit from the plants and put it on a travelling belt just in front of them. The platform is easily detachable and moved from field to field.

510. HAGEMAN, R. H., AND HARTMAN, E. L.

635.64: 631.415.3

Injuries produced by saline and alkaline waters on greenhouse plants and the alleviation of alkaline injury by neutralization.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 375-80, bibl. 4.*

Tomatoes grown in sand cultures treated with unneutralized sodium bicarbonate solutions, 1,500 to 2,000 parts per million, were reduced in dry weight to one-half that of the controls. The plants treated with solutions containing the highest concentration, i.e. 3,000 parts per million but neutralized with H<sub>2</sub>SO<sub>4</sub>, were only slightly injured in growth and appearance. Sulphuric was better than nitric acid and neither superphosphate nor phosphoric acid was of much use for the purpose.

511. WHIPPLE, O. C. 635.64: 632.14

Injury to tomatoes by lightning.

*Phytopathology*, 1941, 31: 1017-22, bibl. 4.

Lightning injury to field-grown tomatoes in south-eastern Wisconsin and northern Illinois is described. The occurrence is fairly frequent. The symptoms are immediate collapse of the plant in severe cases, while plants mildly affected show characteristic symptoms such as—(1) collapse of the stem and drooping of the top; (2) hollowing of stem pith; (3) collapse, especially of the petiole, and desiccation of individual leaves near the periphery of the lightning spot; (4) small longitudinal or circular stem lesions; (5) irregular burnt areas on stems, leaves and fruits; (6) blistering of the surface of the fruit and various degrees of cooking of the underlying tissue. Growth response of the survivors took the form of the development of numerous branches from the axillary buds below the injured stem part and in some cases the development of short branches above the injury. The few fruits set did not ripen.

512. THOMAS, W., AND MACK, W. B.

635.64: 631.83: 632.8

A foliar diagnosis study of greenhouse tomato plants showing symptoms of streak disease.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39: 319-28, bibl. 11.*

In a glasshouse experiment with differentially fertilized tomatoes the plants in one plot treated with N only without manure showed symptoms of having become infected with streak virus 10 weeks after planting. Results of foliar diagnosis indicate that the symptoms were associated with a lower intensity of nutrition and a disequilibrium as regards N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O content, much higher values for N and much lower values for K<sub>2</sub>O being found in the NPK unit of diseased as compared with healthy plants.

513. WENT, F. W., LE ROSEN, A. L., AND ZECHMEISTER, L. 635.64: 581.175.11

Effect of external factors on tomato pigments as studied by chromatographic methods.

*Plant Physiol.*, 1942, 17: 91-100, bibl. 9.

DAWSON, R. F. 633.71-1.541.11:12: 635.64  
Accumulation of nicotine in reciprocal grafts of tomato and tobacco.

*Amer. J. Bot.*, 1942, 29: 66-71, bibl. 10.

See also *Nature*, 1941, 148: 697, *H.A.*, 12: 176.

SCHWANZER, —. 635.64

Der feldmäßige Tomatenbau in Niederdonau (Südmähren). (Field cultivation of tomato on the Lower Danube.)

*Gartenbauwiss.*, 1941, 15: 511-25.

HESTER, J. B. 635.64: 631.84

The efficient use of nitrogen in tomato culture.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 308-12, bibl. 7.

REINMUTH, E., AND ENGELMANN, C. 633.491-2.654.1

Versuche über die Kartoffelnematoden-anfälligkeit verschiedener Tomatensorten. (Investigations into the susceptibility to potato nematode of different tomato varieties.)

*Forschungsdienst*, 1941, 11: 385-7, bibl. 1.

514. HOWARD, F. L., AND DESROSIERS, R. 635.646: 632.48

Studies on the resistance of egg plant varieties to *Phomopsis* blight.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 337-40, bibl. 3.

Notes on field trials. Varieties of egg plant resistant to *Phomopsis* do exist and await further development by the breeder.

515. HELEY, K. 635.65

Haricot beans in a Sussex garden.

*J. roy. hort. Soc.*, 1942, 67: 95-6, bibl. 1.

An account of the cultivation for use as haricot beans of the varieties Comtesse de Chambord, Inépisable and White Leviathan.

516. MAHER, F. A., AND HYAM, G. N. 635.65

The navy bean.

*J. Dep. Agric. Vict.*, 1941, 39: 489-95, 514.

A full account of the methods of cultivation of the navy bean suggested for Victoria, Australia, as a result of 2 years' trials by the Department of Agriculture. The bean is a small white-seeded dwarf French bean (*Phaseolus vulgaris* var.) which is acceptable to the canning and grocery trades. The grocery trade is now buying this type, dried, in preference to the larger haricot bean.

517. DU TOIT, J. J. 635.655

The cultivation of soybeans.

*Fmg S. Afr.*, 1942, 17: 9-16, 53.

The various uses of soybean as food for man and beast, in industry and as an improver of the soil are outlined. In South Africa the soybean gives good results in certain areas where the annual rainfall is 25-35 inches. The fact that it is immune to rust gives an increased latitude in choice of district. It is susceptible to nematode. The only types recommended for S. Africa are the non-shattering types of yellow-seeded varieties evolved by the Potchefstroom College of Agriculture. The fact that until recently all imported seed was of types which shattered in the field as soon as ripe is one of the main reasons why the crop has not been grown in the Union. Most common agricultural soils are suitable. An application of 300-400 lb. of superphosphate per morgen (2 1/9 acres) before sowing is advised, but the residual effect of manure applied to the previous crop in the rotation is a sufficient substitute. The soybean has a

specific strain of nitrogen-producing bacteria and seed inoculation is necessary, the method being described. Inoculated seed must not be sown in conjunction with fertilizer or the bacteria may be killed. No inoculation is needed for future soybean crops on the same land provided it is grown once every three or four years. Sowing is usually done mechanically, the seeds being 2-3 inches apart, 2 inches deep, in rows spaced 24-30 inches or closer on irrigated land. 60-80 lb. of seed is required per morgen. Weeds must be kept under control. To prevent shattering in the field the beans must be harvested at the right moment, i.e. when the pods turn brown but the plant stems are still succulent. They are cut with a mower or sickle and dried in windrows for a few days before stacking. Various methods of threshing are noted. Non-irrigated demonstration plots at Standerton yielded 19 bags per morgen. Instruction for making hay and silage are also given.

518. WALLACE, J. C. 635.656: 631.563.2

Peas for drying.

*J. roy. hort. Soc.*, 1942, 67: 56-8.

The garden cultivation of peas for drying for later consumption is described. There are two types of pea, the small blue, represented by Prussian, Louth or Lincoln Blues and a large blue, of which Harrison's Glory or its continental selection Koopman's Glory are the best known. Cultivation is much the same as for garden peas. Staking, while not necessary, is helpful. Harvesting methods are important. The haulm is cut close to the ground just as the bottom pods show signs of yellowing. The plants are either left on the ground to dry, being frequently turned, but not when wet from rain or dew, or better, hung on a simple framework which can be easily constructed from peasticks. After a fortnight the peas should be dry and may be separated by pulling off the pods by hand or more quickly by laying the haulms on a sheet or sacking and beating with a heavy stick. The haulms are then shaken out with a fork and removed. The small debris mixed with the peas can be winnowed by sifting and sanning. A preliminary soaking of 12 hours followed by a slow simmering for 20-25 minutes in water to which a pinch of bicarbonate of soda and sugar have been added is the best way of preparing them for the table.

519. H., A. D. 635.656: 631.563.2

Protein from the garden.

*J. roy. hort. Soc.*, 1942, 67: 15-6.

To supply protein during the winter months the author recommends that the field pea, Harrison's Glory, should be grown for drying. In his opinion it provides a safer crop than haricot beans, being less dependent on the weather. One pint will sow a row 80 feet long and the yield is from 16-20 fold.

520. WEAVER, R. J. 635.655: 632.954

Some responses of the bean plant to chlorate and perchlorate ions.

*Plant Physiol.*, 1942, 17: 123-8, bibl. 2.

PRIEBUS, K. 635.656

Der Vermehrungsanbau von Gemüseerbsen. (Seed production of garden peas.)

*Mitt. Landw.*, 1941, Vol. 56, Hft 8, pp. 146-8 from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 98.

521. CAIRNS, D. 633.88

Production of botanicals in New Zealand.

*Bull. imp. Inst. Lond.*, 1941, 39: 361-3.

The article gives a short account of the establishment of experimental plots near Wellington, New Zealand, for the production of botanical drugs, under the direction of the D.S.I.R. Twenty-one species were grown as a start, all grew well and produced viable seed. Trial shipments to England of selected varieties has begun. The soil is a silty loam of alluvial origin, the rainfall 40 inches, the mean summer and winter temperatures 60° F. and 46° F.



respectively and the average relative humidity 73 and 78%. The district is frost-free.

522. MINISTRY OF AGRICULTURE, BRITISH COLUMBIA.  
633.88.32.594.5

**Propagation of the cascara tree, a conservation initiative.**

*Bull. Minist. Agric. Victoria, B.C.*, 108, 1941, pp. 9.

British Columbia is the only part of the British Empire where *Rhamnus purshiana*, cascara sagrada, is native. Three hundred tons of wild bark are harvested annually and the careless methods employed render it probable that this yield will not be maintained. The bulletin explains in simple language how the tree may be recognized at any time of the year (in winter it has a distinctive appearance even from a distance by being the only deciduous wild tree in British Columbia without protective bud scales on its dormant buds). The method of propagation by collected seed is described. The most suitable situations for the tree are banks of ditches and streams or hillsides moistened by seepage water, or on rich well drained loam well watered in summer. Here the wild tree may be sought or nursery-raised seedlings transplanted. Both bark and wood contain the drug, more than 50% being in the wood. For lack of facilities for dealing with the wood in Canada only the bark is harvested, and this in such a manner as to kill the tree. The correct way to harvest is explained, namely, to cut the tree down leaving a stump from which new shoots will arise to provide a further crop in a few years. No tree under 5 inches in diameter should be harvested. The bulletin contains many other hints for conserving the tree and handling the produce.

523. REGEL, C. 633.85

In Mitteleuropa wildwachsende und angebaute Ölpflanzen. (Wild and cultivated oil plants of Central Europe.)

*Angew. Bot.*, 1940, 22: 6: 400-13, from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 61.

The author considers oil seed bearing plants of central Europe. The oil percentages and the iodine numbers and, where figures are available, particulars of returns per acre are given for some 163 plants. The following genera are noted as being particularly rich in different oils:—*Coniferae*, *Labiatae*, *Papaveraceae*, *Euphorbiaceae*, *Compositae*.

524. CONIN, W. 633.85: 633.42

Verbesserte Arbeitsverfahren im Raps- und Rübsenbau. (Improvement in methods of dealing with rape and turnip seed oil.)

*Arbeit Reichsnährstand* 54, Reichsnährstand Verlag Berlin 1939, pp. 40, 1.10 RM, from abstract *Forschungsdienst*, 1941, Vol. 12, abstr. p. 9.

Apparently a practical, illustrated account both of the cultivation and processing of rape and turnips grown for oil.

525. MELVILLE, R. 633.859

Cultivation and food value of the oil poppy.

*Gdnrs' Chron.*, 1941, 109: 54, bibl. 2.

WARNE, L. G. G. 633.859

The oil poppy.

*Gdnrs' Chron.*, 1941, 110: 229.

In the first of these articles particulars are given of the edible nature of the seeds and oil of the oil poppy (*Papaver somniferum*) and of its different types of flower. It is noted that up to 1914 14 acres of such poppies formed part of the rotation at Haxey on the Isle of Axholme (Stevenson in *J. roy. agric. Soc.*, 75: 83-4) and it is suggested that a source of seed to those wishing to try it are the poppy capsules of the chemist or the so-called Maw seed obtainable from dealers in bird seed.

In the second article—actually a letter to the editor—the author describes his trials of poppy seed from a capsule sown on 15 April, 1941, in a 25-foot row at Manchester.

The capsules were almost ripe and were harvested on 4 September. They were dark in colour and on some there was a little mould. The yield of seed was low, only 3.5 gm. per capsule. From 25 square feet a yield equivalent to 446 lb. per acre was obtained or about the same as that obtained by native cultivators in India. The seed harvested contained 41.4% of oil and nitrogen equivalent to 24.7% of protein and was in composition, therefore, comparable with seed obtained from areas more favoured climatically.

526. COTTINGHAM, J. 633.859

The oil poppy.

*Gdnrs' Chron.*, 1942, 111: 80.

From two poppy heads obtained from a chemist six 30 feet rows were sown in March in shallow drills drawn 9 inches apart. Subsequently the seedlings, which germinated freely, were thinned to 6 inches. The crop yielded 2 quarts of seed from 1½ bushels of heads. The seed heads were attractive to tits which in consequence did not injure peas growing nearby.

527. KLEMM, M. 635.624: 633.85

Der Kürbis und seine Bedeutung als Ölpflanze. (*Cucurbita pepo* and *C. maxima*, their importance as oil plants.)

*Forschungsdienst*, 1941, 11: 676-98, bibl. 34.

A survey of the origin, distribution, importance and cultivation of certain sorts of pumpkin or squash for oil production. The following, among other, points are made:—1. A comparison is made of *Cucurbita pepo* and *C. maxima*. 2. These two species occupy an extremely important place among plants which will ripen in Germany and whose seeds contain valuable oils and proteins. 3. The average oil content of the seeds varies from 45 to 50%, the protein content is more than 30%. Specimens like *C. pepo* with its naked seeds are particularly suitable for oil extraction. 4. The average seed content of each fruit amounts to from 1.1 to 2.9 lb. 5. The amount of both seed and oil is about the same both in dry and wet years. 6. The oil produced by *C. pepo* varies with the number of plants and fruits from 602 to 1,559 lb. per acre. 7. The oil contains no harmful ingredients and is widely used for cooking in East and South-east Europe. 8. It is a slow-drying oil, its iodine number varies from 115.52 to 130.8, saponification number 191.5 to 195.68 and acidity 0.6173 to 1.29. 9. The plant can be grown either from seed or slips in the open. 10. Close planting results in increased oil production; a spacing of 1.0 × 0.5 m. should result in about 2 tons of seed per acre. 11. *C. pepo* plants from Styrian seed sown at Berlin Dahlem in 1940 ripened satisfactorily despite bad weather. 12. It was found that the fruit skins split and fungous infection occurred inside as the result of continuous wet weather. 13. The only disease which seriously affected plants at Berlin Dahlem was *Sporidesmium mucosum*. 13. *C. pepo* is preferable to *C. maxima* for ordinary German conditions. 14. *C. pepo* can be grown wherever maize will ripen. 15. The cultivation of *C. pepo* should afford an excellent source of cooking-oil and of a valuable high-protein foodstuff for stock.

528. JASPER, H. 631.8: 633.52 + 633.854.54

Grundfragen der Düngung bei Faser- und Öllein. (Fertilizers for flax and linseed.)

*Diss. Univ. Bonn*, 1939, pp. 72, from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 61.

A noticeable feature in the nutrition of *Linum* is the marked formation of substance and the quick uptake of K and N prior to bud formation. Fertilizers must be given early, preferably in soluble form and at latest before cultivation, the K and P in winter, the N just before cultivating. The forking in as a top dressing of small amounts of very readily available nitrogenous fertilizer is also recommended.

529. ELLIOTT, A. G., AND LYNCH, P. B. 633.52  
Linen flax.  
*N.Z. J. Agric.*, 1941, 63: 1, 3-5, 7.  
An account is given of the current methods of growing linen flax with special reference to New Zealand.
530. FISCHER, E. 633.527  
Der Anbau einer neuen Faser- und Bienenfütterpflanze. (The cultivation of a new fibre and bee plant.)  
*Pflanzenbau*, 1941, 17: 212-8.  
A description of the cultivation and possibilities presented by *Asclepias incarnata* as a fibre plant beloved of bees. The fibre content of the stalk is said to be from 13 to 16%. The fibres are soft, pliable and strong and are bright brown. The plant is self- and cross-pollinated and so presents no difficulties to the breeder. It is not particular as to type of soil. It will yield between 1400-2150 lb. fibre per acre annually.
531. JOHNSON, J., AND OGDEN, W. B. 633.71-2.8  
Tobacco mosaic and its control.  
*Bull. Wis. agric. Exp. Stat.* 445, 1939, pp. 22.  
The authors summarize the results of experiments which have been of the most practical interest to those wanting to control tobacco mosaic and make definite recommendations.
532. WOODS, M. W., AND DuBUY, H. C. 633.71-2.8  
Synthesis of tobacco mosaic virus protein in relation to leaf chromoprotein and cell metabolism.  
*Phytopathology*, 1941, 31: 978-90, bibl. 20.  
JOHNSON, J., AND OGDEN, W. B. 633.71  
Tobacco varieties and strains in Wisconsin.  
*Bull. Wis. agric. Exp. Stat.* 448, 1939, pp. 30.  
JOHNSON, E. M., AND VALLEAU, W. D. 633.71-2.3  
Control of blackfire of tobacco in Western Kentucky.  
*Bull. Ky agric. Exp. Stat.* 399, 1940, pp. 19-39.  
JEWETT, H. H. 633.71-2.765  
Wireworm injury to tobacco plants.  
*Bull. Ky agric. Exp. Stat.* 398, 1940, pp. 16, bibl. 6.  
BYERS, G. B. 633.71-1.56  
Heat of curing white burley tobacco with artificial heat.  
*Bull. Ky agric. Exp. Stat.* 406, 1940, pp. 335-51.  
JEFFREY, R. N. 633.71-1.56  
The effect of temperature and relative humidity during and after curing, upon the quality of white burley tobacco.  
*Bull. Ky agric. Exp. Stat.* 407, 1940, pp. 355-83, bibl. 9.

## FLOWER GROWING.

533. DUNSTER, B. P. 631.53 + 631.87  
Sphagnum moss peat and its uses.  
*Gdnrs' Chron.*, 1942, 111: 7.  
Attention is called to the many uses of sphagnum moss peat in the garden particularly for potting composts and for mulching.
534. HOPE, C., STOUTEMYER, V. T., AND CLOSE, A. W. 631.53 + 631.462: 632.4  
The control of damping-off by the use of sphagnum for seed germination.  
*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 397-406.  
In over 15 years' work at the U.S. Plant Introduction Garden, Glenn Dale, Md, complete control of damping off has been obtained by the use of living sphagnum moss as a medium for seed germination. Comparative tests show that as regards control of damping-off sphagnum is greatly superior to other unsterilized media tried. Compared with sterilized soil its only advantage is simplicity. Mixtures of sand and peat moss proved inferior to sphagnum. The use of sphagnum obviates the expense of soil sterilization. Without sterilization of seed or medium and with little attention to watering sphagnum gave as good results over a wide range of seeds as any other medium regardless of treatment and for a wide range of seeds. In other needs of a germinating medium it is always equal and generally superior to soil and sand.
535. LAURIE, A., AND KIPLINGER, D. C. 635.9: 631.544  
Growing ornamental greenhouse crops in gravel.  
*Bull. Ohio agric. Exp. Stat.* 616, 1940, pp. 49, bibl. 15.  
Hydroponics applied to greenhouse flowering plants suitable for the cut flower trade. The term "gravel" here means any similar inert medium, e.g. cinders, which will afford root hold and into which nutrient solutions are usually pumped automatically at regular intervals. An interesting and unusual experiment was made with epiphytic *Cattleya* orchids which are always grown in osmunda fibre to which only water is applied. Although older plants transplanted to the nutrient gravel suffered from shock and in general were less successful than those remaining in the fibre young seedlings taken straight from the propagating flask became greener and larger in sand receiving nutrient solution than those transplanted to fibre and treated in the usual way by watering only. (The use of liquid manure or fertilizer on orchids in fibre has seldom been of benefit). Results and cultural notes are given for a number of popular plants such as sweet peas, chrysanthemums, etc.
536. CHADWICK, L. C. 635.976: 631.8  
Fertilization of ornamental trees, shrubs and evergreens.  
*Bull. Ohio agric. Exp. Stat.* 620, 1941, pp. 29, bibl. 16.  
Surface feeding of ornamentals, e.g. trees on lawns, is not always feasible or useful either because the grass is damaged or because the fertilizer will not reach the roots quickly. Phosphorus, for instance, will remain in the surface inch or two for over a year. The bulletin is largely concerned with the feeding of trees by fertilizers placed in holes in the ground round the tree and considers methods of distribution of this fertilizer in the soil by means of air and/or water pressure. Some interesting studies of root distribution are provided. Fertilizer formulae for various types of tree and shrub are suggested.
537. LAWRENCE, W. J. C. 635.964  
The origin of the garden dahlia.  
*Publ. (out of series) John Innes hort. Inst.*, undated, received March, 1942, pp. 8.  
The garden dahlia, *Dahlia variabilis*, already domesticated in Mexico before 1575, was first introduced into Europe in tuber form in 1789. No great developments took place until Humboldt sent home seeds in 1804. Within 12 years practically every colour known to-day had appeared. The reasons for the profusion of form and colour in the dahlia are (1) being self-incompatible it can never breed true, (2) the factors producing flower colour are in duplicate, 2 for flavone (ivory and yellow) and 2 for anthocyanin (pale and deep pigmentation) and (3) each of these factors is represented 4 times (*D. variabilis* has 64 chromosomes). The evidence suggests that the plant arose as a hybrid between polyploid members of 2 colour groups and that doubling of the chromosome number accompanied this hybridization.



538. CLAPP, R. 612.014.44  
A simplified method of determining the date of bud formation in short-day crops.  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 361-2, bibl. 1.  
In order to change the date of blooming of plants which are stimulated into flowering by decreasing the length of day it is essential first to know at what date the normal day length is short enough to induce flowering. According to the procedure described here supplementary illumination is applied to the crop near the time when the days are becoming short enough for normal bud formation. At given intervals part of the crop is returned to normal day length. If the normal day length is still too long for bud formation this plot will flower at the same time as the check, but if a plot is returned to normal day length after the days have become short enough to induce bud formation the plant will flower later than the check. The method enables the normal date of bud formation to be located within a 2 or 3 day period.
539. ZELLER, A. 635.966  
Blumenschnitt und Blütenzahl. (Flower production affected by cutting.)  
*Gartenbauwiss., 1940, 14:* 665-70.  
If flowers of *Calendula*, *Tagetes*, *Rudbeckia* and *Lathyrus odoratus* were cut at the market ripe stage, the plants produced twice or three times as many more flowers as they did if the flowers were allowed to seed. It is suggested that the substance which inhibits flowering is produced, at latest, when the first flower begins to go to seed.
540. FEATHERBY, H. G. 631.541.11: 631.541.12  
Influence of stock on scion.  
*Gdnrs' Chron., 1942, 111:* 80.  
Successful trials of chrysanthemum grafted on *Artemisia* spp. and other chrysanthemums.
541. KUNKEL, L. O. 632.8  
Heat cure of aster yellows in periwinkles.  
*Amer. J. Bot., 1941, 28:* 761-9, bibl. 15.  
The periwinkle plants affected by yellows were cured by being held in a hot room at 38°-42° C. for two weeks or alternatively by immersion for a few hours in a hot water bath held at 40-45° C.
542. RATSEK, J. C. 635.937.34  
Some factors causing fading in color of rose blooms.  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 419-22, bibl. 5.  
Notes were made on the effect of defoliation, number of buds per stem, bagging and sugar solution on colour of flowers in the Talisman rose. The colour of flowers opening at different times on the same stem was also observed. There was abundant evidence that the development of a deep colour is dependent on available carbohydrate supplies. Some of the summer fading may be due to sunlight but it is more probable that with increasing temperatures there is also an increase in wood growth. A competition occurs between flowers and growing points for available carbohydrates. If growth proceeds at the expense of cyanin formation flower colour fails to develop to its proper intensity.
543. BOICOURT, A. W., AND ALLEN, R. C. 635.937.34  
Effect of aeration on growth of hybrid tea roses.  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 423-6, bibl. 6.  
All roses were budded on *Rosa multiflora* var. *japonica* cuttings. They were grown in (a) clay soil without aeration, (b) clay soil with forced aeration, (c) clay-peat mixture without aeration, and (d) clay-peat mixture with aeration. Aeration resulted in nearly doubling the growth in each case. The differences in results are discussed.
544. DOUGETTE, C. F. 635.944: 632.6/7  
Control of insects and mites attacking narcissus bulbs.  
*Fmrs' Bull. U.S. Dep. Agric. 1890, 1941, pp. 25, 10 cents.*  
Full, illustrated descriptions are given of the attacks made on narcissus bulbs by the narcissus bulb fly (*Merodon equestris*), the lesser bulb flies (*Eumerus* spp.), the bulb mite (*Rhizoglyphus hyacinthi*) and the bulb scale mite (*Tarsonemus laticeps*). Methods of control recommended and described include field treatments and storage season treatments. The only field treatment found effective against bulb flies in the U.S. is the protection of valuable bulbs by the construction of cheesecloth-sided cages during the period of possible infestation. Storage treatment includes HCN fumigation, which is effective only against the larvae of bulb flies, and heat treatment, either hot water or vapour, which is effective against all bulb pests. Apparatus and the technique of applying such treatment are discussed.
545. REINHOLD, J. 635.944  
Versuche über die Ertragsleistung der Tulpenzwiebeln. (Tulip cultivation.)  
*Gartenbauwiss., 1941, 15:* 399-417.  
Notes on suitable previous crops, planting distances and cultivation of tulips.
546. BRIERLEY, P., AND CURTIS, A. H. 635.935.722  
Further studies on factors affecting the forcing performance of Easter Lily bulbs. (Abstract.)  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 432.  
Effect of time and temperature of storing on performance of Easter Lily bulbs. [The complete article will appear in *J. agric. Res.*]
547. POST, K. 635.935.722  
Problems in forcing Easter lilies.  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 415-8, bibl. 2.  
The effects on vegetative growth, flowering and time of bloom of the Easter lily of varying the phosphate in the soil, removing scales and varying temperature and light are noted.
548. WHEELER, K. E. 635.936.751: 631.8  
The effect of organic materials and other treatments on the growth of delphinium species.  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 407-10, bibl. 2.  
MEHLQUIST, G. A. L. 635.936.751: 632.421.1  
The reaction of thirteen California species of delphinium to powdery mildew (*Erysiphe polygoni*).  
*Proc. Amer. Soc. hort. Sci. for 1941, 1941, 39:* 411-3.  
Mildew susceptibility is found to be dominant.

## CITRUS AND SUB-TROPICALS.

549. GREIG, A. W. M. 634.3  
(Recognition of citrus varieties.)  
*N.Z. J. Agric., 1941, 63:* 148-9, 243-4, 338-9, 434-5, 520-1.  
The above heading covers a series of five articles describing the citrus commonly grown in New Zealand. I: *Citrus rootstocks in New Zealand*, pp. 148-9. The title is inadequate in that the rootstocks are only briefly mentioned. Sweet orange is regarded as the safest all-round rootstock while rough lemon is the standard stock for lemons. The remainder of the article describes 8 lemons and 3 limes or near limes. II: *Classification of oranges*, pp. 243-4. III: *Navel and Island oranges*, pp. 338-9. In II, 9 Spanish Mediterranean and blood oranges are described. In III,

7 navel oranges and 3 oranges of a type grown throughout Polynesia are dealt with. IV. *Recognition of mandarins*, pp. 434-5. Eight mandarin or mandarin hybrids are described. V. *Recognition of citrus varieties*, pp. 520-6. Five grapefruit and one pomelo-sweet orange hybrid (Poorman orange) are described. Descriptive notes on 8 species or interspecific hybrids are given. Hybridization being such a common occurrence in the genus a chart is presented in which are shown the various crosses and the general names given to their hybrids, e.g. kumquat (*C. fortunella*) × lime (*C. aurantifolia*) = limequat.

550. TRIAS, A. 634.3  
El problema citricola en el pais. (*Citrus problems in Uruguay.*)  
*Rev. Fac. Agron. Montevideo*, 1941, No. 24, pp. 67-79 + tab. 6.

The paper is concerned with the measures to be taken to place the citrus industry of Uruguay on a sound footing and to establish an export trade. The recommendations in the main follow such normal lines as siting the plantations only where the soils and climate are suitable and where transport is available, in reducing the number of varieties grown in rigid selection, etc. Great importance should be attached to quality and packing. Grading should be severe. The local oranges contain many excellent varieties. These should be thoroughly investigated with a view to propagating the best and eliminating the others. Uruguay might very well establish a local orange variety which could compete successfully in foreign markets. Meanwhile foreign standard varieties which are known to do well must also be grown, special attention being paid to late varieties such as Valencia and Lue Gim Gong. A number of other standard varieties (Navels) are named which, while of excellent quality, are not to be recommended because of their irregular yields in some districts. Tables are given which show the present extent of cultivation in the various provinces, the chemical analyses of different sorts of citrus and their varieties and much other information. The part which the research institutes would play in this project is the subject of constant allusion.

551. RICHARDS, A. V. 634.334  
Notes on fruit culture. I. Cultivation of lemons.  
*Trop. Agriculturist*, 1941, 97: 129-31.

The commercially important lemon varieties Eureka, Lisbon, Villafranca and Genoa are described. Eureka, a thornless tree producing freely, but from its habit rather liable to sunburn the fruit, is that chiefly grown in California. Some notes are given on picking and grading. In Ceylon lemons are grown in the semi-dry areas at 3,000-4,500 ft. An account is given of the good progress made by some South African lemons, Genoa on rough lemon, imported by the Uva Orange Farm, Diyatalawa, and now growing at 4,300 feet, the annual rainfall being 63 inches with a drought period of 3½ months.

552. KIMBROUGH, W. D., AND PAGE, G. N. 634.31  
A comparative study of quality in oranges from Louisiana and other States.  
*Bull. La Agric. Exp. Stat.* 311, 1939, pp. 16, bibl. 21.

Analyses and tasting tests of the same varieties of orange, sweet orange, the navel type and Satsuma grown in different districts show that generally speaking the California section produces a very thick-skinned orange with extremely high acidity and high percentage of solids, the Louisiana section a very thin-skinned orange with a juice of superior flavour, the Florida section an orange with a low percentage of peeling and high volume and percentage of juice, and the Texas section an orange which is very sweet owing to its low ratio of acid to sugar. As between very small and very large oranges, the smaller the size the higher is the percentage of juice and the acidity.

553. SALTER, A. G., AND SMOYER, K. M. 634.3  
A program for growers to increase efficiency.  
*Calif. Citrogr.*, 1942, 27: 91, 110.

The subjects discussed are—Analyses of the orchard with a view to the replacement of unprofitable trees; irrigation; pest control; the use of artificial and organic manures; cover crops and their treatment; cultivation, which should be as shallow as possible and performed when the soil is as dry as possible; pruning, which should be practised only to remove large dead wood, broken branches and poorly placed suckers, since under normal conditions the removal of fruit wood reduces yield and does not improve fruit quality; record keeping of costs and returns, which should be compared with the county citrus cost study records.

554. LAL SINGH, BAL SINGH AND KHAN, A. A. 634.31-1.8

*Citrus manuring. I. Fertilizer experiment with sweet orange (Malta) growing on rough lemon.*  
*Indian J. agric. Sci.*, 1941, 11: 778-94, bibl. 26.

The investigations were carried out at Lyallpur over a period of the five years 1933-38. The trees were 9-year-old Malta orange on rough lemon and every precaution was taken to ensure uniformity at the start. The 3 treatments consisted of annual doses of 4, 8 and 12 lb. respectively of ammonium sulphate applied half prior to blossoming in February and half in mid-May. In the final year a dressing of 60 lb. farm manure was applied to each tree including the controls owing to the appearance of mottle leaf. No significant difference in size was observed in the trees as the result of the various treatments and the control or in yield as between the various treatments. There was a slight increase in yield of the treated trees over the controls. The application of farm manure gave increased yield over fertilizer alone and the most profitable results were obtained by the 4 lb. application plus farm manure, the presence of the latter being here apparently essential to enable the trees to make full use of the inorganic nitrogen supply.

555. MOORE, E. C. 634.3-1.86  
Fertilizing citrus with manure.  
*Calif. Citrogr.*, 1942, 27: 67, 88.

The use of farmyard manure on citrus is discussed. High grade feed-lot manure, No. 2 poultry manure and others of this class may be used as a sole basis of a fertilizer programme if applied consistently and with method. Bulky yard manure containing large amounts of straw should be supplemented with chemical nitrogen.

556. CROUS, P. A. 634.3: 581.192: 632.951.23  
The reduction of acidity in Valencias by the use of arsenical sprays.  
*Citrus Gr.*, 1941, No. 94, pp. 1, 3, 5, 7, 9.

Arsenical sprays can be safely used for reducing the high acidity of Valencia oranges in S. Africa. There is a carry over effect from one year to the next, but spraying in 2 successive years results in insipid fruit. It is suggested that one-third of the crop should be sprayed annually. The concentration advised is 2 lb. lead arsenate, with or without casein spreader, per 100 gal. water. The spray should be applied in January and should wet the foliage thoroughly. Navel oranges should not be sprayed with arsenicals. [For previous article see *Ibidem*, 1940, No. 82, H.A., 11: 162.]

557. UGÓN, N. A., AND BERTULLO, W. A. 634.3-1.547.6: 577.16

Grado de madurez de los citrus del Uruguay comparado con su riqueza en ácido ascórbico. (The relationship of ripeness to vitamin C content in Uruguay citrus.)

Reprinted from *Rev. Fac. Agron. Montevideo*, 1941, No. 23, pp. 19, bibl. 14.

Tables and graphs show the weekly vitamin C content during ripening for 14 weeks of Uruguay citrus, namely, lemon, tangerine, lime, grapefruit and sweet orange. The



reducing and total sugars, citric acid, pH and weights are also shown for the same period.

558. BAIN, F. M. 634.3-2.19  
**Mineral deficiencies in citrus.**  
*Proc. agric. Soc. Trin. Tob.*, 1941, **41**, 657-9, 661,  
 663, 665, 667, 669, 671, 673, 675.

Deficiency symptoms in citrus do not necessarily resemble symptoms of similar deficiencies in other crops. **Nitrogen.** A general yellowing of the leaves, especially of the fruiting branches, no vein abnormalities. In chronic cases trees are stunted, growth short and irregular. **Phosphorus.** Never observed in the field. Under greenhouse conditions leaves become small, dull, bronzed and brittle, with irregularly placed scorched areas. Marked absence of root branching. **Potassium.** Not yet recorded under field conditions. Under controlled conditions rapid growth of over-sized crinkled leaves. Non-rigid terminal branches, die back and gumming. **Magnesium.** (Bronzing.) Occurs chiefly during fruiting and only in mature leaves on fruiting branches, especially near the fruit. Disconnected yellow areas on each side of mid-rib, coalescing to form well-defined yellow area surrounding triangular green tissue at base of leaf. Finally whole leaf may turn yellow or bronze. Older leaves fall early, resulting in sparse foliage. **Iron** (Iron chlorosis.) Fine network of green veins on light green or white background. Severe dieback at tree top resulting in greatly reduced size and crop. **Copper** (Dieback, exanthema). Leaves at first unusually dark green; later, twigs die back while bearing very small yellow-green leaves easily detached. Mature leaves on these shoots may show a reddish sheen. Twigs in early stages vigorous, long, angular and often S shaped, later with gum pockets under the bark near leaf bases. The affected twig is covered with a typical reddish-brown gummy excrecence. Fruit symptoms occur mainly on orange. They consist of brown excrecences of hardened gum on the rind, splitting of rind and round the seed and premature dropping. **Zinc** (Frenching, mottle leaf). The most common deficiency. Partial leaf chlorosis, parts adjoining mid-rib and lateral veins remaining green. Degree of chlorosis increases with severity of deficiency. Leaves small, pointed, narrow in acute and of normal size in mild cases. Young growth chiefly affected on occasional weak twigs or throughout the tree. In acute cases tree presents a bushy appearance with rapid dieback and consequent reduction in size. As with some other deficiencies many unmottled watershoots develop. **Manganese.** Often associated with zinc deficiency. On the young leaves a fine pattern of green veins on lighter background resembling, but less pronounced than the zinc deficiency pattern. In older leaves a band of green along the mid-rib and lateral veins with light green areas between the veins. The contrast is faint and best seen when the leaf is held up to the light. With maturity the leaf appearance is dull instead of glossy, the light areas becoming grayish. Size and shape of leaf remain normal. **Boron.** Leaf symptoms are still in dispute though there is general agreement that small water-soaked spots appear on young leaves, becoming translucent with maturity. Fruit symptoms are not in doubt. They consist of brown discoloration in the white portion of the rind, gum formation and unusually thick albedo on young fruit. Older fruits misshapen, with undeveloped seeds, gum deposit in fruit axis and lacking juice. **Calcium.** Not yet described under field conditions. In water culture overgreen colour of leaf in early stages. In advanced stages yellow at leaf tip and edges extending gradually to centre and base. Trees stunted with hardened bark. In vein chlorosis the mid-rib and lateral veins lose colour compared to the rest of the leaf. It may follow bark or root injury. Probably denotes premature senescence of the leaf, being a mechanism to maintain balance between water absorbing and transpiring organs and to conserve nitrogen. **Boron toxicity.** Caused by excess boron in irrigation water or sometimes from borax-dipped fruit boxes

placed under the tree. Yellowing of leaf tips increasing along leaf edges till large part of the leaf is involved. Green colour persists along base of mid-rib. Scorching of leaf margin, leaves leathery and tough: severe defoliation in bad cases. Mild cases recover, severe cases cannot be successfully treated. **Treatment.** In all other deficiencies mentioned above, control can generally be obtained by adding the missing element to the soil or by spraying with it, but for iron deficiency such treatment has not proved effective nor has the method of injecting iron salts been very successful.

559. HAAS, A. R. C. 634.3-2.191  
**Lime-induced chlorosis of citrus in relation to soil factors.**

*Plant Physiol.*, 1942, **17**: 27-51, bibl. 9.

Lime-induced chlorosis is an important physiological disturbance in the nutrition of citrus. A number of citrus orchards in Southern California were examined. The tree condition and soil pH values were found to change with increasing or decreasing elevations in orchard location. At moisture percentages near or greatly above the moisture equivalents calcareous soils may be quite alkaline while at low moisture content they may be quite acid. The pH values of a soil at the field moisture content are usually lower in soils of healthy than in those of chlorotic orchards. The length of time that the roots of a tree in a calcareous soil are subjected to a given pH and hence the continuity of a given soil moisture percentage are of importance. With this continuity go the factors of aeration as well as those of sustained hydrolysis and its precipitation effects. In healthy citrus tree areas in calcareous soils the moisture equivalents either decreased or remained unchanged with increasing depth. In chlorotic areas in calcareous soils the moisture equivalents steadily increased in heavy soils and abruptly increased in lighter soils with increasing depth. [From author's summary.]

560. (CORY, W.) 634.3-2.183  
**Windbreaks require care.**  
*Calif. Citrogr.*, 1942, **27**: 67.

Successful tree windbreaks in California are limited to eucalyptus and certain species of cypress. They must be cared for by occasional cutting of the roots and trimming of the branches. Machines are available for this. Fertilizers and adequate water will be needed or the windbreak will rob the adjoining citrus. It is recommended that in any event citrus bordering the windbreaks should receive extra fertilizer and water.

561. COCHRAN, F. D. 634.3-2.111  
**Citrus orchard heating in Louisiana.**  
*Bull. La agric. Exp. Sta.* **312**, 1940, pp. 27,  
 bibl. 12.

Results of orchard heating over a period of 3 years in Louisiana citrus orchards are recorded. Heating, which was by crude oil in converted 5 gallon paint drums, 100 to the acre, was very successful against both winter and spring frosts.

562. DASTUR, J. F. 634.3-2.4  
**Pink disease of orange trees in the Central Provinces.**  
*Indian J. agric. Sci.*, 1942, **11**: 892-901, bibl. 9.

Pink disease of orange trees in the Central Provinces, India, caused by *Corticium salmonicolor* is described. Orange and lemon trees were successfully inoculated in Nagpur but the infection did not spread in the following wet season from tree to tree in the same plant house or even from a diseased to a healthy limb. For reasons which are given it is considered that spraying would not be an effective prophylactic measure. It would be more advantageous to scrape the cankers on infected trees and dress the wounds with creosote oil or bordeaux paste. Forks of infected trees, especially those of the main branches, should be scraped and dressed. Diseased limbs should be cut back well beyond the extent of the infection.

563. BIOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, NEW SOUTH WALES. 634.3-2.651.3  
The citrus nematode.

*Agric. Gaz. N.S.W.*, 1942, 53: 31-2.

The citrus nematode (*Tylenchulus semipenetrans*) parasitises the young fibrous roots of citrus. The head of the parasite becomes permanently embedded in the outer root tissue, the rest of the body remaining outside. The eggs are laid in the surrounding soil. Otherwise healthy trees are not affected by even a heavy infestation; in less robust trees it may be a contributory cause to unthriftness. Control is often achieved by the incorporation of animal manure in the soil, thereby encouraging rapid fibrous rootgrowth.

564. BOYCE, A. M., KORSMEIER, R. B., AND PERSING, C. O. 632.654.2: 634.3

The citrus bud mite and its control.

*Calif. Citrogr.*, 1942, 27: 124-5, 134, 136-8, 140-1, bibl. 3, being *Pap. Riverside Citrus Exp. Stat.* 448.

The paper discusses distribution and bionomics of the citrus bud mite, *Eriophyes sheldoni*, which has recently become epidemic on lemons in California. Oil sprays, sulphur and sulphur-containing materials such as 2-4-dinitro-6-cyclohexylphenol (or TEADN) and HCN fumigation are reviewed and their history as control agents examined. A seasonal history of the mite in relation to control is given. A control programme is suggested consisting of two treatments annually, one in late winter or in spring by the time 20-30% of the buds are infested, the other during the fall. An early fall treatment, e.g. in September, will necessitate an earlier spring treatment the following season. The spray recommended is 1½% to 2% light medium grade oil, or ¾% to 1% if rotenone (quantity unspecified) is added. Where it is not feasible to use an oil spray in spring on account of the crop maturing, one of the sulphur treatments may be substituted with equally good results.

565. BEDFORD, E. C. G. 634.3-2.73

The biology of the citrus thrips.

*Citrus Gr.*, 1941, No. 95, pp. 1, 3, 5, 6-8, bibl. 2.

The article is an abstract from the author's report which is to be issued as a Science Bulletin of the Department of Agriculture and Forestry, Union of South Africa.

566. ALLISON, J. R. 634.3-2.951

Spraying citrus trees.

*Calif. Citrogr.*, 1941, 27: 34.

No significant difference in kill of red scale was observed between citrus trees sprayed when wet and when dry in California. It is shown that when an oil and water mixture contacts the leaf the tendency is to build up an oil film, the water already present on the leaf running off to the ground. The more turgid the leaf, the less oil will be absorbed and the more effective will be the oil left for insect control. Thus spraying a tree slightly wet with morning fog or dew is likely on the whole to be beneficial.

567. RIVNAY, E. 632.77: 634.3

The activity of the Mediterranean fruit fly at cold temperatures, with reference to its status during the citrus season in Palestine.

*J. ent. Soc. S. Afr.*, 1941, 4: 166-76, bibl. 2.

Laboratory and other observations indicate that the Mediterranean fruit fly does not become really active at a temperature below 16° C. It will not oviposit below this temperature or at a relative humidity above 85% or on rainy days. It is suggested that stung fruit should remain on the trees until the activity of the fly ceases since such fruit is stung many times, the flies often preferring to lay in the oviposition holes already made by earlier visitors. Thus other fruit as yet unattacked may be spared.

568. LEWIS, H. C., AND LAFOLLETTE, J. R. 632.64

Control of European brown snails.

*Calif. Citrogr.*, 1942, 27: 122, 144.

Poison baits consisting of 1 lb. calcium arsenate mixed with 16 lb. moist flake bran is broadcast over the trees or placed on the ground round the trunk in summer or autumn. In winter and spring ground baiting is omitted in favour of broadcasting since the young snails then remain largely in the trees. Metaldehyde baits are ineffective when broadcast and during cold weather. If used they should be placed in small piles where reached by sunshine and used only in the warmer part of the year. Fresh pressed citrus pulp 100 lb. with calcium arsenate 4-5 lb. is the most effective bait yet tried.

569. HOFFMANN, G. P., AND LUTZ, J. M. 633.492-2.111

Preliminary results of delayed harvest of sweet potatoes for industrial purposes.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941*, 39: 303-7, bibl. 1.

Evidence indicates that delaying the harvesting of sweet potatoes beyond the time of slight frost occurrence may not have serious effects on decay or starch content provided the tubers do not have to be stored after harvesting.

570. ANDERSON, W. S. 633.492-1.67

A preliminary study of some water relations in the sweet potato.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941*, 39: 295-8, bibl. 2.

There are indications that it may be possible to influence the moisture and carbohydrate contents of sweet potatoes by irrigation.

571. BURK, E. F., AND TENNYSON, G. 633.492-2.651.3

Hot water treatment for control of nematodes in sweet potato seed roots.

*Proc. Amer. Soc. hort. Sci. for 1941, 1941*, 39: 299-302, bibl. 2.

Results of trials indicate that *Heterodera marioni* on sweet potato can most safely be controlled by immersing the roots in a hot water bath, temp. 116° F., for 65 minutes.

572. POWELL, H. R. 633.85

Some facts relating to the growing of tung oil trees in Western Australia.

*J. Dep. Agric. W. Aust.*, 1941, 18: 228-9, bibl. 1.

Tung trees (*Aleurites fordii*) have been planted in various parts of Western Australia, usually on a small scale. Interesting variations in growth habits have been noticed at different centres. At Byford, trees bordering a small stream are single trunked and multi-storied, assumed to be the natural habit. In the Mundaring district the trees did not branch till 6 to 8 feet from the ground. These trees suffer wind damage. Elsewhere the trees are low-headed with a branching system of carriage-wheel type. The poor growth so prevalent is attributed in part to erroneous early advice that ploughing and cultivation were unnecessary and to recent difficult climatic conditions. Experiments are now in progress to test the effects of good cultural and manurial treatments. It is by no means certain that even under the best conditions tung will be successful on a commercial scale. Selection and propagation of suitable types will follow if results in the cultural trials justify it. Under normal conditions in Australia it appears that unless yields can be built up to exceed the 190 lb. of oil per acre (quoted here as an average yield) it will not be possible to spend much on the upkeep of the plantations.

573. COIT, J. E. 551.566.1: 634.1/7

Orphan subtropical fruits.

*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 50-7.

The commercial possibilities of a number of subtropical fruits that grow well in Southern California are discussed.



That these fruits have not made headway in the markets is attributed largely to the conservatism of retailers, who will not touch anything with which they are unfamiliar. Other reasons for failure are also given, lack of publicity and financial backing for advertising campaigns being the chief. Many small markets have been lost through buyers of the crops on the trees picking too early, when the fruits are still sour.

574. SCHROEDER, C. A. 634.413: 581.162.3  
Hand pollination effects in the cherimoya (*Amnona cherimola*).

*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 94-8.

In the coastal area of S. California hand pollination greatly increased fruit set and the percentage of perfect and near perfect fruits of the cherimoya and did not increase the inherent seediness of the fruit.

575. NEUHAUS, —. 634.51 + 634.521: 551.566.1  
Der Anbau der Walnuss (*Juglans* sp.) und Pekannuss (*Carya* sp.) in den Tropen und Subtropen.  
(The cultivation of the walnut and pecan in the tropics and sub-tropics.)  
*Tropenpflanzer*, 1940, 43: 375-8.

A brief review of the different species of walnut and pecan and the methods of cultivating and propagating them in hot lands.

576. GORE, U. R. 634.58  
Cultural methods for growing peanuts.  
*Circ. Ga agric. Exp. Stat.* 131, 1941, pp. 4.

Recommendations to those intending to grow peanuts for oil in Georgia where hitherto they have been mainly a Coastal Plain crop.

577. BLISS, D. E., MOORE, D. C., AND BREM, C. E. 634.62: 581.144.2: 631.436  
Air and soil temperatures in a California date garden.  
*Soil Sci.*, 1942, 53: 55-64, bibl. 7.

Data are given on the weekly mean temperatures of air and soil within the U.S. Date Garden at Indio, California, from September 1934 to January 1939. The temperatures of the air and of the soil at 1 and 3 ft., depths were recorded continuously by thermographs, those of the soil at 4, 6, 7½ and 8 feet were determined weekly. The yearly range of air temperatures was considerably greater than that of the soil at 1 ft., i.e. in 1935 28-112° F. as against 47-92° F., or in 1938 34-114° F. as against 51-89° F. The yearly range of temperatures diminished with increasing depth of soil, those at 7½ feet being 64-76° F., 61-77° F. and 64-76° F. in 1936, 1937 and 1938 respectively. In root observations the following root distribution was noted:—0-1 ft. 1-7% roots by weight, 1-2 ft. 15-4%, 2-3 ft. 26-4%, 3-4 ft. 23-6%, 4-5 ft. 24-7%, 5-6 ft. 7-2%, 6-7 ft. 0-3%, and 7-8 ft. 0-7%.

578. ROUNDS, M. B. 634.653  
Observations on the avocado variety situation.  
*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 30-4.

Some new varieties or variants of avocado which have appeared in recent years are discussed. The position in regard to a number of the most popular, established, commercial varieties is reviewed from the point of view of their weaknesses and their probable future in commerce. Objections are raised to all of them on one ground or another with the exception of Fuerte. Owing to the excellence of this variety and its continual pictorial advertisement the public is being trained to demand a Fuerte-like fruit. The result is that interest among growers in varieties not resembling this type is liable to wane, a matter for regret.

579. MARSH, R. H. 634.653  
Thinning crowded avocado orchards.  
*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 58-9.

In the early days of avocado planting the spacing employed was too close. The result of this practice is that the lower

limbs are shaded out, especially on plantations of suitable soil types, and the bearing surface is reduced to 48,000 sq. ft. per acre. Actually trees should be so spaced that when fully grown the lower skirts of adjacent trees will meet. In such circumstances the bearing surface will be 68,000 sq. ft. per acre, an increase of 41%. Fuerte avocado, the principal variety, decreases with age its vertical growth as compared with its lateral growth, otherwise close planting would matter less. Before thinning the grower should be in possession of a 3-year yield record for each tree with data on health and vigour. A thinning programme is presented for an orchard 7 years old from date of planting planted 20×20 feet, 109 to the acre. Every other tree in each row is regarded as a temporary (T) tree, the remaining trees in every other row being considered semi-permanent (S-P) and the remainder permanent (P.) trees. In the first phase the long lateral limbs of the T trees are kept cut back, and all low yielding trees or those with definite sun-blotch symptoms are removed. Two exceptionally good trees adjacent to each other can be treated as one unit. At eleven years of age the T trees are all removed (with reference, however, to their yield record) and the S-P trees are trimmed back in so far as they compete with the P trees. By the 15th year the S-P trees are removed or grafted to an erect-growing variety. Thus from a planting of 109 to the acre only 27 are left. Groves planted at 30×30 ft. may only require pruning plus the removal of diseased trees.

580. DeBARD, A. S. 634.653-1.51  
Permanent cover versus cultivation.  
*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 75-6.

Shallow cultivation of avocado orchards resulted in an increased profit compared to comparable untilled orchards under the same management. The author considers weed suppression to be necessary and discusses methods of doing this economically. Untilled orchards of the 30 avocado plantations in his charge show a decline in appearance of trees and in fruit grades, though not necessarily in yield.

581. MARSHBURN, A. R. 634.653-1.51  
Permanent cover for avocado orchards.  
*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 77-8.

Provided ample irrigation water is available avocado orchards are better in every way if the soil is left untilled. In the orchard discussed here performance was greatly improved when weed cover, in this case Bermuda grass, was allowed to grow and the amount of water increased. The soil, formerly light and sticky, gradually became very friable and in good physical condition. The equivalent of 4 lb. of nitrogen per tree is applied in the form of organic manure placed under the shade of the trees where the leaves fall and soon cover it. The surface roots are never cut or disturbed.

582. MARSH, R. H. 634.653-1.432  
Moisture requirements of the avocado.  
*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 92-3.

Avocado trees, especially on ill-drained soils, can be seriously injured by over-irrigation and should this be corrected recovery will be slow. Injury will not be apparent on the above ground parts of the tree till after a considerable portion of the root system has been damaged.

583. HAAS, A. R. C. 631.432: 634.653 + 634.33  
Soil moisture range and the growth of young lemon and avocado plants.  
*Yearb. Calif. Avocado Soc.* 1941, 1942, pp. 87-91, bibl. 8.

In the citrus and avocado orchards of S. California marked improvement in tree health has been obtained by partially drying out the soil and thus rendering the pH more acid with greater availability of nutrients. But drying out may produce troubles such as reduced fruit size and quality and leaf burn in mature leaves. The problem discussed is how to maintain soil moisture percentage close to field capacity without seriously raising the pH values of these soils.

584. WARD, W. F. 634.653-2.111  
Observations on protection of avocados from cold injury.  
Yearb. Calif. Avocado Soc. 1941, 1942, pp. 99-101.  
Young avocado trees under 3 years old should be banked with earth or covered with litter, etc., before a frost. The banks should be removed when danger from that particular cold period is over. Large trees must be protected by heating. The author describes the heating method in use in his own orchard, the material used being wood for firing and rosin-batting dross for lighting.
585. HORNE, W. T., PARKER, E. R., AND ROUNDS, M. B. 634.653-2.8  
The nature of sun-blotch and its practical control.  
Yearb. Calif. Avocado Soc. 1941, 1942, pp. 35-8.  
Evidence is produced to show that the sun-blotch disease of avocado (described fully) is produced by a virus. It exists in the roots as well as the stems and natural root-grafting between a diseased and a neighbouring healthy tree may prove one means of transmission. Artificially the disease has only been spread by budding or grafting from or on to diseased plants. Cutting with pruning knives, which have previously cut diseased trees, has failed to transmit it, as has inoculation with sap from such trees. Control measures can only consist at present in the use of healthy stock for propagation. Although the disease does not always materially injure the tree it may be the beginning of a general decline as in psoriasis of citrus. It seems highly desirable to replace diseased trees with healthy ones whenever this can be done without undue loss.
586. ANON. 634.653-2.6/7  
Avocados, too, have insect pests.  
Calif. Citrogr., 1942, 27: 112-3, 115.  
A summary of a circular issued by the San Diego, California, county department of agriculture. (Exact reference to the circular is not given.) Avocado brown mite. Effectively controlled by one to three sulphur dustings annually. Temperature should be above 70° F. Wettable sulphur sprays, 2 to 4 lb. per 100 gal. water, are also efficient. Leaf-eating insects. Spray with arsenate of lead 4 lb., blood albumen spreader 6 oz., water 100 gal. Greenhouse thrips. The egg is laid in the leaf tissue. Repeated spray applications at 30-day intervals are advised. Pyrethrum extract  $\frac{1}{2}$  pint, light medium oil  $\frac{1}{2}$  gal., water 100 gal., or blackleaf-40 1 pint, casein spreader 1 lb., water 100 gal. Mealybug. The only control appears to be the ladybird beetle. This is distributed free to infested groves. Ants are inimical to this beetle and must be destroyed. Latania scale. Fairly well controlled by a black, red-spotted ladybird. Brown snails destroy blossoms and young fruit. They readily accept poison baits. (For composition, not given here, see Hort. Abstr., 1940, 10: 1135, and abstr. 568 in the present number.) Decline. Attributed to unfavourable soil and water conditions in combination with a root fungus. Dothiorella gregaria. For this rot spray when the fruit has reached egg size, use commercial bordeaux mixture 16 lb., casein spreader 1 lb., water 100 gal. Remove all dead twigs. Little-leaf. Spray with zinc sulphate 10 lb., hydrated lime 6 lb., casein spreader 1 lb., water 100 gal. Trunk and limb cankers. Scrape the affected area well above and below it and paint with cyanide of mercury 1 part, alcohol 500 parts, water 500 parts. Sunblotch. An infectious virus disease spreading throughout the entire tree. The use of certified bud-wood is advised.
587. APPLEMAN, D., AND NODA, L. 634.653: 581.145: 581.192  
Biochemical studies of the Fuerte avocado fruit. A preliminary report.  
Yearb. Calif. Avocado Soc. 1941, 1942, pp. 60-3, bibl. 4.  
SHARPLESS, B. H. 634.653-1.542  
Tying, propping and pruning avocado trees.  
Yearb. Calif. Avocado Soc. 1941, 1942, pp. 105-6.  
GREGO, A. 634.62  
The American date industry.  
Yearb. Calif. Avocado Soc. 1941, 1942, pp. 126-30.  
GARMENDIA, L. I., AND COSTA, A. 633.85  
Consideraciones técnico económicas sobre el cultivo del girasol. (Technical and economic considerations on sunflower cultivation in Uruguay.) Rev. Fac. Agron. Montevideo, 1941, No. 24, pp. 87-93.  
GRANER, E. A. 634.651  
Observações sobre a distribuição do sexo no mamão. (Notes on sex distribution in Carica papaya.) (English summary.) Rev. Agric. S. Paulo, 1941, 16: 341-51, bibl. 6.

## TROPICAL CROPS.

588. CÁRDENAS, M. 581.9(84)  
Recursos naturales del reino vegetal en Bolivia. (Natural resources of the vegetable kingdom in Bolivia.)  
Chron. bot., 1941, 6: 404-6, bibl. 6.  
Bolivia contains many plants of economic value the exploitation of which has hardly begun. The vegetation of the various regions into which the country is physically divided is discussed. Most of the botanical work is done by the University of Cochabamba and the Escuela Superior Agronomica de Bolivia, attention being mainly centred on potato and maize. Economic indigenous plants receiving mention are Bertholletia excelsa (Brazil nut), Copaifera sp., Simaruba glauca, the bark of which is specific against dysentery, Swietenia mahagoni (mahogany), Astronium urundeuva, Orbygnia phalerata, a palm producing a fine oil.
589. SKUTCH, A. F. 633/635  
The natural resources of Costa Rica.  
Chron. bot., 1941, 6: 399-402, bibl. 4.  
Coffee is the most important product of Costa Rica, over 20 million kg. being exported in 1939. Shade trees favoured for coffee are Inga spp. and Erythrina spp.: A troublesome pest is a fungus, Omphalia flavida. Bananas come second in export importance. Panama disease (Fusarium cubense) has ruined production in the Caribbean lowlands but the centre of production has now shifted to the Pacific Coast, where sigatoka disease (Cercospora musae) is kept in check by spraying. Cacao is waning in importance, exports in 1939 amounting to 7.6 million kg. Among vegetables the chayote (Sechium edule) is very commonly grown. Temperate vegetables are grown in the highlands. Vegetables grown at lower altitudes include cassava, sweet potato, Xanthosoma spp. and others. Although there have been sporadic attempts to export pineapples and oranges, among fruits only the banana is exported. Fibre plants for local use include the cabuya (Furcraea cabuya), Manila hemp and burío (Heliocarpus sp.). Medicinal plants include ipeacacanha root (Cephaelis ipeacacanha). There is a Government school and Agricultural Experiment Station at San Pedro de Montes de Oca.
590. SVENSON, H. K. 581.9(866)  
The vegetation of Ecuador. A brief review.  
Chron. bot., 1941, 6: 446-8, bibl. 1.  
In this review Ecuador is partitioned into 10 subdivisions each with its distinct flora. The more prominent species in each are enumerated.



591. SMITH, A. C. 581.9(88)  
**The vegetation of the Guianas, a brief review.**  
*Chron. bot.*, 1941, 6: 449-50, bibl. 9.  
 The Guianas are divided into four primary vegetational zones, namely the littoral strip, the rain forest, the savanna (upland and swamp) and the region adjacent to Mount Roraima. The more important plants and plant groups are named. The Leguminosae provide the most species.
592. HODGE, W. H. 581.9(729)  
**The natural resources of the Lesser Antilles.**  
*Chron. bot.*, 1941, 6: 448-9, bibl. 6.  
 The lesser Antilles may be divided into two groups, the sugar cane-producing and the fruit-producing islands. Agriculture is the sole resource of both groups. The French islands are the best developed and richest owing to a profitable export trade with France. The English islands suffer from poverty because the mother country can obtain tropical produce in greater and cheaper quantities from other Empire sources, thus forcing the islands to seek outlets for their produce in Canada and U.S.A. Some sort of crop control is required whereby each island could be assigned a definite crop for which there is a constant demand. The U.S.A. for instance has urgent need of quinine which could probably be established in the islands. Gardening should be encouraged to render the population self-sufficient as regards food.
593. WILLIAMS, L. 581.9(85)  
**The phytogeography of Peru.**  
*Chron. bot.*, 1941, 6: 409-10, bibl. 8.  
 A survey of the regional vegetation of Peru together with a summary of the more important botanical expeditions to the country. A map is appended showing the distribution of the various plant formations.
594. GURVICH, B. R. 581.9(899)  
**La vegetación del Uruguay. (The flora of Uruguay.)**  
*Chron. bot.*, 1941, 6: 410-1, bibl. 7.  
 For the purposes of plant geography Uruguay can be divided into the following zones, prairie, coppice, riverain, mountain, maritime sand and palm land. The chief plant formations peculiar to each are enumerated. Palm lands are chiefly colonized by *Butia capitata* with a ground cover of grass and are in danger of disappearing because of the consumption of the fruits and young plants by cattle.
595. CÁRDENAS, M. 581.9(84)  
**Aspecto general de la vegetación de Bolivia. (Review of the vegetation of Bolivia.)**  
*Chron. bot.*, 1942, 6: 452-4, bibl. 5.  
 HODGE, W. H. 581.9(729)  
**The vegetation of the Lesser Antilles, a brief review.**  
*Chron. bot.*, 1942, 6: 402-4.  
 WILSON, S. G. 63  
**Agricultural practices among the Angoni-Tumbuka tribes of Mzimba. (Nyasaland).**  
*E. Afr. agric. J.*, 1941, 7: 89-93, bibl. 1.
596. COOLHAAS, C. 551.566.1: 633/635  
**Zijn er mogelijkheden voor het planten van andere gewassen dan de thans in Oost-Java gecultiveerde? (The possibilities of planting other crops than those at present grown in East Java.)**  
*Bergcultures*, 1941, 15: 1252-9.  
 The crops considered are tung oil, perilla oil, Manila hemp, ramie, *Amorphophallus* spp. for its meal (iles-iles), pyrethrum and derris. Crops which have been tried before and failed for reasons which are discussed are coca, kapok and cacao. Circumstances have since altered, improvements in market or plant material have come about and it is suggested that in place of coffee which has been grubbed on account of eelworm attack there might be planted either derris or cacao, depending on situation, with the subsequent addition of kapok. [Both derris and cacao are, according to de Fluiter (*Ibidem* 15: 1588-93, *H.A.*, 12: 625) susceptible to coffee eelworm although apparently not visibly injured by it, so far as can be judged by the appearance of their foliage.—Ed.]
597. SUKHATNE, P. V. 631.8  
**Economics of manuring.**  
*Indian J. agric. Sci.*, 1941, 11: 325-37, bibl. 4.  
 "A great deal remains to be done in getting the economics of manuring down to a precision that can be expressed in a table or graph." The main object of this paper is to present a test of significance for profit in its application to some actual data.
598. REGE, R. D. 631.874  
**Green manuring.**  
*Indian Fmg.*, 1941, 2: 521-3., bibl. 4.  
 An account of the general principles of green manuring with special reference to India. Mention is made of a weed, *Desmodium diffusum*, locally known as patada shevra, which is showing great promise as a green manure.
599. KUILMAN, L. W. 581.144.2: 631.874  
**Wortelstudies aan tropische landbouwgewassen I. Wortelontwikkeling en vruchtbaarheid. (Root studies in tropical crops. I. Root development and fertility.)**  
*Landbouw*, 1941, 17: 673-90, bibl. 1.  
 Deep-rooting cover crops or weeds (treated as green manure) will bring up and make available to shallow rooting crops nutrient elements which would otherwise be out of their reach.
600. MASEFIELD, G. B. 631.459  
**Narrow-base ridges for erosion control.**  
*E. Afr. agric. J.*, 1942, 7: 167-71.  
 The usefulness of narrow-base ridges (bunds) for erosion control after some years' trial in Uganda is discussed. Details of construction are given. Although regarded in U.S.A. as practically obsolete they have been found of use in Uganda in areas where the cultivation is chiefly by hand, the cattle population low and on the steeper slopes.
601. SINCLAIR, A. J. 633.73-1.459  
**Control of erosion. Strip-weeding in coffee.**  
*Mon. Bull. Coffee Bd Kenya*, 1942, 7: 8, 4.  
 The author records a system of erosion control used on his coffee plantation in Kenya. Instead of cultivating through the whole plantation which might take six weeks, he cultivates alternate strips, i.e. down one side of the tree in the first instance. The strips left unweeded act as erosion barriers against heavy rains. By the time the return journey down the still uncultivated side is started danger of heavy rain has ceased. It is claimed also that there is less danger of checking the tree since any root injury caused by cultivation on one side will be on the way to being repaired by the time the other side is reached. The value of the method to various Kenya soil types is the subject of a note by Mr. V. A. Beckley, Senior Agricultural Chemist, who points out that in some cases mechanical reinforcements to hold up the run off would be necessary.
602. VAN LEEUWEN, W. 631.459  
**Aantekeningen over erosie. (Notes on erosion.)**  
*Landbouw*, 1941, 17: 542-50, bibl. 13.  
 A discussion on soil erosion in general with special reference to the position in Java.
603. HARDY, F. 631.459  
**Soil erosion in Trinidad and Tobago.**  
*Trop. Agriculture, Trin.*, 1942, 19: 29-35.

- STAPLES, R. R. 631.459  
Combating soil erosion in the Central Province of Tanganyika Territory, Part I.  
*E. Afr. agric. J.*, 1942, 7: 156-65, bibl. 5.
- KANITKAR, N. V., DAJI, J. A., AND GOKHALE, V. N. 631.459  
Surface run-off and soil erosion from arable lands in the Bombay-Deccan.  
*Indian J. agric. Sci.*, 1941, 11: 493-545, bibl. 24.
- COSTER, C. 631.459  
Begroeiing, grondsoort en erosie. (Vegetation, soil character and erosion.)  
*Landbouww.*, 1941, 17: 551-79, bibl. 9.
604. AMANI. 633/635: 631.531  
List of food crop varieties available for distribution, 2nd edit.  
*Publ. (out of series) East Afr. agric. Res. Stat. Amani*, Jan. 1942, pp. 8.  
The source of origin, and brief details of characteristics, such as height, earliness, rust resistance, etc., are given.
605. PARHAM, B. E. V. 631.462+631.531.17  
Plant protection. [Soil and seed disinfection.]  
*Agric. J. Fiji*, 1941, 12: 103-4, bibl. 1.  
Methods of soil sterilization suitable for use on native smallholdings and gardens in Fiji are briefly outlined. Steam sterilization is ruled out as being too difficult. Fire. Where wood is abundant sterilization by fire is commonly used by Chinese market gardeners. The amount of wood required is equal to a solid layer 3 inches thick. *Chemical methods.* (1) *Formalin*. One gal. commercial formalin diluted with 100 gal. water applied at the rate of 10 gal. per sq. yard. The soil is covered immediately after application with sacks or dead grass to retain the fumes. Seeds or plants must not be put in till at least a fortnight after treatment. (2) *Bluestone*. One pound bluestone dissolved in 7 gal. water watered in as for formalin will eradicate the common pathogen, *Sclerotium rolfsii*. Apply at the rate of 2 gal. per sq. yard, or until the soil is wet to a depth of 6 inches. A few weeks delay before using the ground is necessary. *Cheshunt compound*. Valuable in controlling damping off of seedlings. It does not injure but rather stimulates growing seedlings. The stock mixture consists of 2 oz. copper sulphate (bluestone), 11 oz. ammonium carbonate (rock ammonia) ground separately before being thoroughly mixed and stored in a tightly stoppered jar for at least 24 hours. For use dissolve the mixture in water at the rate of 1 oz. to 2 gal. *Seed disinfection*. Commonly used seed disinfectants are corrosive sublimate, formalin, hot water, copper carbonate, copper sulphate and proprietary compounds usually containing mercury. Directions for use are not given since specific treatments are required for various types of seed.
606. CORBETT, G. H., AND PAGDEN, H. T. 632.6/7  
A review of some recent entomological investigations and observations.  
*Malay. agric. J.*, 1941, 29: 347-75, bibl. 16.  
The results from some entomological investigations which have been or are in progress in Malaya are reported. Most of the important crops are covered and some interesting observations and useful suggestions are made.
607. NATTRASS, R. M. 632.651.3: 633.491  
Notes on plant diseases.  
*E. Afr. agric. J.*, 1942, 7: 166.  
A note on the effect of root-knot eelworm (*Heterodera marioni*) on potato tubers in Kenya. The symptoms are quite unlike those produced by this eelworm on the roots of plants, bearing on the potato a superficial resemblance to common scab. The damage caused by the potato eelworm *H. schachtii*, so far not found in Kenya, is distinct. In the case of *H. marioni* the damage to the tubers is superficial and the danger lies largely in the subsequent infection of succeeding susceptible crops.
608. ANON. 633.52+633.854.54  
Linseed growing with special reference to the tropics.  
*Bull. imp. Inst. Lond.*, 1941, 39: 368-70.  
Linseed can be grown between the 10th and 65th parallels of both north and south latitudes and nearer the equator if at appreciable altitudes. In Java a satisfactory drying oil cannot be obtained below 3,500 ft. In Kenya the best flax fibre was obtained at from 7,000 to 9,000 ft. Dual purpose flax, producing good quality seed and fibre, has been evolved for temperate regions, but has not yet been tried in the tropics. Linseed will grow on a wide range of soils, though different types are required for heavy or light soils. In Bengal on heavy soil the yield is 650-730 lb. per acre from a seed rate of 16 to 24 lb. per acre. Higher yields are obtained from specially selected seed. The article concludes with brief cultural notes.
609. MOHAMMAD, A., AND KHAN, A. R. 633.52-1.521  
Some breeding investigations on linseed (*Linum usitatissimum* L.) in the Punjab.  
*Indian J. agric. Sci.*, 1941, 11: 432-45, bibl. 3.
610. GREENWAY, P. J. 633.526.42  
Bowstring hemp or Sansevieria fibre.  
*E. Afr. agric. J.*, 1941, 7: 96-7.  
*Sansevieria* has never proved profitable as a fibre crop though concessions for harvesting the wild plants have often been granted. There are 25 species found in East Africa, and the fibre-producing kinds are not found by themselves but intermixed with varieties worthless for the purpose and are therefore difficult to collect. Further, those reputed to yield the best fibre have only 1 to 11 leaves and are never found in large enough quantities for their fibre to be put on the market with sufficient regularity to create a demand. Water and food supplies for a labour force in uninhabited countries have to be considered and a system of decortication needing water would add greatly to the cost. Too little is known about *Sansevieria* to make it a commercial proposition as a plantation crop.
611. D'EMMERZ DE CHARMOY, A. 633.682  
Le manioc. (Cassava.)  
*Rev. agric. Maurice*, 1941, 20: 286-9.  
The article is concerned with the possibility of substituting locally grown cassava for the imported rice which is the staple diet of Mauritius, should imports for any reason be unavoidably reduced. Cassava at present appears only occasionally at table in the island. Its dietetic value and methods of preparation are discussed.
612. SPRINGENGUTH, W. 633.682  
Die Kultur des Manioks, seine Krankheiten und Schädlinge im Litoral des Staates Sta. Catharina (Brasilien). (The cultivation, diseases and pests of cassava on the coast of Sta. Catharina, Brazil.)  
*Tropenpflanzer*, 1940, 43: 286-306.  
*Manihot utilisissima* Pohl. ranks with maize as the chief crop of the district. It grows easily in all soils not too clayey or wet. No manure is given as it is believed that this produces a kind of root rot, though in the author's opinion it is due to other causes. Planting is done between September and December. The cuttings are taken from the middle of a well ripened stem. The varieties grown are almost without exception the sweet varieties whose roots contain the least amount of hydrocyanic acid. Latterly, a few varieties of the bitter manioc have been grown exclusively for the production of starch. The varieties, which are known mostly by German names, differ in shape and colour of the leaves, pedicels and stipules, whether the stem has or has not leaves, the extent to which it is branched, the method of attachment of the rhizomes and the skin and flesh colour of the tubers. There are also, of course, great differences



in taste, cooking quality and starch content. Cultivation consists mainly in repeated hoeing to keep down weeds. The young plants are separately earthed up and after the first vegetative period the dry tops of the leafless shoots are broken off 4-6 weeks before the development of the new shoots. The tubers ripen 14-18 months after planting. Only one variety has been established that after 6 months yields a product suitable for human consumption and for fodder. The yield is, however, much lower than that of the other varieties. Flowering occurs between December and March. As manioc is grown on the same soil year after year it provides a happy hunting ground for fungous and insect diseases. Of the fungous diseases, *Cercospora cassavae* attacks the sweet manioc but the bitter manioc is resistant. The disease can be controlled by the use of bordeaux mixture. A *Fusarium* causing root and stem rot is also described. Another disease causing black markings in the root is probably due to *Pseudomonas*. Among pests are *Lonchaea chalybea* which destroys the shoots; *Dilophonea ello* L., the caterpillar of which devours the leaves; and the borer, *Coelostereum rugicollis*. These are described. Galls also cause damage.

613. PRUTHI, H. S., AND SAMUEL, C. K.

633.71-2.8: 632.7

Entomological investigations on the leaf-curl disease of tobacco in Northern India. IV. Transmission of the disease by white-fly (*Bemisia gossypiperda*) from some new alternate hosts.

*Indian J. agric. Sci.*, 1941, 11: 387-409, bibl. 12.

At least one alternate host has been discovered for each of 5 types of tobacco leaf-curl of which the vector is the white fly, *Bemisia gossypiperda*. These hosts are *Zinnia elegans*, *Solanum nigrum*, *Euphorbia hirta*, *Vernonia cinerea*, *Lycopersicon esculentum*, *Sida rhombifolia* and *Scoparia dulcis*. Thus control by eradication of host plants would seem to be impracticable. Encouraging results have been obtained by attacking the vector at suitable times with dusts and sprays.

614. EDEN, T.

633.72-1.52-1.535

The selection of high-yielding tea bushes for vegetative propagation.

*Tea Quart.*, 1941, 14: 98-102.

The following procedure is recommended. Select a number of the best bushes by eye. Record the flush counts for each mother bush and total the counts at the end of the fourth and eighth pluckings. If the bushes comprising the best 2% are made up of the same individuals on each of these occasions, they may be chosen for propagation. If not, then the counting must be continued for another group of four pluckings or till stability is reached. It is immaterial whether the ranking within the top 2% remains stable, so long as no gaps occur in the order of merit.

615. EDEN, T., AND BOND, J.

633.72-1.535

The technique of vegetative propagation of tea.

*Tea Quart.*, 1941, 14: 102-5.

A revised and more successful method of propagating tea from cuttings is explained. Use single node cuttings of rigid green or young red wood from bushes in active growth. If growing an axillary shoot pinch back to its fish leaf. Beds are made up with 6 inches of soil from drains, or soil and peat, 3: 1, overlying 4 inches of small ashless cinder or road metal. Never use coir dust or fibre either alone or mixed with soil. An alkaline reaction in the bed due to the use of building rubble with mortar or soil from unsuitable sites must be avoided. Plant firmly, up to the leaf axil. Cover the beds heavily with fern immediately. Adequate light is thus better provided than in sheds or frames. Water thoroughly after planting and subsequently as required but not daily. Many past failures have been due to overwatering. Transplant carefully to baskets when rooted, i.e. in 3-6 months and again fern. The plants can now be transplanted to the field when convenient or maintained as nursery plants. Transplants must be shaded. Hortomone

A as a root producing stimulant was effective but unnecessary. It failed to break down inherent resistance to root formation on the part of individual bushes.

616. LAMB, J.

633.72: 581.192

Tea in relation to food and drug regulations.

1. Ash contents.

*Tea Quart.*, 1941, 14: 110-3, bibl. 1.

The ash contents of a number of Ceylon teas produced under a wide range of conditions has been investigated in order to determine the variation which may be expected in the ash contents of genuine Ceylon teas. Taking round figures and thereby allowing margins for exceptional cases we arrived at the following characteristics:—1. Total ash is not less than 4% and not more than 7% of the dry weight of tea. 2. Soluble ash is not less than 2% and not more than 5% of the dry weight of tea. Expressed as a ratio to total ash the soluble ash varies between 50% and 70%. [Author's summary.]

617. GADD, C. H.

633.72-2.78-2.96

The control of tea tortrix by its parasite *Macrocentrus homonae*.

*Tea Quart.*, 1941, 14: 93-7, bibl. 3.

In Ceylon the tea tortrix (*Homona coffearea*), an important pest of the tea bush, appears to have been successfully controlled by the parasitic wasp, *Macrocentrus homonae*, imported from Java in 1935 and 1936.

618. VERBEEK, F. A. TH. H.

633.72-2.754

Bestrijding van *Helopeltis* in thee door middel van dertissuifmengsels. (Control of *Helopeltis* on tea by means of dertissuif preparations.)

*Bergcultures*, 1942, 16: 30-2.

619. COSTER, C.

633.72+633.912+633.88.51

The work of the West-Java Research Institute, Buitenzorg, 1938-41.

*Emp. J. exp. Agric.*, 1942, 10: 22-30, bibl. 31.

The West-Java Research Institute serves all the tea plantations of the Dutch East Indies (138,000 ha), cinchona cultivations (more than 17,000 ha), and the rubber plantations of the west of Java and south and west Sumatra (160,000 ha). Notes are given here of work on these crops including the following:—*Tea*. 1. Botanical investigations including anatomy of leaf, deficiency symptoms, vegetative propagation methods, floral biology. 2. Selection. 3. Chemistry, especially the tannins. 4. Preparation of tea. 5. Agricultural investigations including plucking methods, planting distances, fertilizer trials. 6. Plant pathological investigations. *Rubber*. 1. Botanical investigations including deficiency symptoms, stock scion relations. 2. Selection including testing of new selections, exchanges with Ceylon, Malacca and Sumatra. It may be noted that the clone Tjirandji I, put on the market in 1928, is still one of the highest yielders. 3. Chemistry. 4. Preparation of rubber including smoking technique, packing, coagulation problems. 5. Agricultural investigations including the renovation of old plantations, tapping systems, fertilizer trials, spacing and thinning, topping. 6. Plant pathological investigations. *Cinchona*. 1. Botanical investigations concern variations in quinine content. Selection with a view to increasing the quinine content. The original low quinine content has now been raised to 12-15% with some clones known to give 17-18%. 3. Chemistry chiefly analytical. 4. Agricultural investigations include estimation of production of quinine on a given area, spacing and thinning, soil composition. 5. Plant pathological investigations cover various diseases and pests.

620. LAMBERS, M. H. R.

633.73-1.521

Koffieselectie en koffie-plantmateriaal. (Coffee selection—plant material.)

*Bergcultures*, 1941, 15: 1522-32.

The aims of coffee selection are outlined and various crossings and their results are discussed. Some of these hybrids are illustrated.

621. ISASCA, A. J. V. 633.73  
 Vijftientwintig jaar "Robusta". (Twenty-five years of robusta coffee growing.)  
*Bergcultures*, 1941, 15: 1364-72.  
 The author recounts his experiences with a plantation of robusta coffee in Java. The plantation has been under his control from its beginning in 1916. The subject matter chiefly concerns methods of pruning, training and top-working which were experimented with in the course of the years and the results obtained, especially in respect of yield.
622. MCMASTER, P. G. W. 633.73-1.542  
 Some notes on the management of the multiple-stem system of growing coffee at the lower altitudes of Kenya.  
*E. Afr. agric. J.*, 1942, 7: 142-5 and *Mon. Bull. Coffee Bd Kenya*, 1942, 7: 16-7.  
 These notes are based on 16 years' experience at Donyo Sabuk, Kenya, at 4,800 ft., average annual rainfall 36·83 in., June to September being the dry months. The advantages of the multiple stem system over the single-stem system of growing coffee are:—A. Easier and cheaper pruning. B. Easier regulation of crop. C. Less biennial cropping. D. Less susceptibility to certain pests and diseases. E. Higher average yield. F. Bigger percentage of the higher grades. The disadvantages compared to the single-stem system are:—A. Breakage from wind and picking. B. More difficult and expensive mealy-bug control. C. Unpopularity with pickers. D. Tendency to crop early and in big flushes. (The trade are prejudiced against early coffee.) E. Untidy appearance. All these factors are dealt with seriatim and some general notes are added. The method is clearly illustrated by diagrams.
623. GETHIN-JONES, G. H. 633.73-1.8  
 Further notes on the manuring of coffee.  
*Mon. Bull. Coffee Bd Kenya*, 1942, 7: 22-3.  
 The notes refer more especially to the manuring of coffee in Kenya under wartime conditions. Sources of nitrogen other than sulphate of ammonia are discussed. The basis of manuring should be the preparation of the maximum amount of farmyard manure and the method of preparing this to the best advantage is described. Meat meal and bone meal is available. Comparable applications would be 150 lb. per acre of blood meal, meat meal or hoof and horn meal, 250 lb. carcase meal, 170 lb. carcase meal mixed with 50 lb. of any of the first mentioned materials and 150 lb. of bone meal similarly mixed with 100 lb. of the more nitrogenous materials. A light cultivation should follow the application of any of these. Cotton seed can be applied at the rate of  $\frac{1}{2}$  ton per acre. It would need to be buried deeply enough to prevent germination and  $\frac{1}{4}$  to  $\frac{1}{2}$  the normal bulk of farmyard manure would be required in addition to provide sufficient nitrogen to equal that of the meat manures if this is considered necessary. Supplies and prices are discussed. For phosphatic fertilizers bone meal or Seychelles phosphate are both still procurable. Bone meal must be worked deep into the soil. 1 cwt. per acre every other year should be enough on land previously kept well manured. Potassic fertilizers cannot now be imported but the Kenya coffee soils mostly require none. In certain lighter and more acid soils wood ash at the rate of  $\frac{1}{2}$  ton per acre can be broadcasted.
624. SNOEP, W. 633.73-1.4  
 Over boniteitsfactoren bij koffiegroenten en den invloed, die bodembehandeling daarop heeft. (Improvement of coffee soils and the effect which cultivation has on them.)  
*Landbouw*, 1941, 17: 651-72.  
 Problems on which research is necessary are pointed out.
625. DE FLUITER, H. J., AND MULHOLLAND, J. J. 633.73-2.651.3  
 Gegevens, verkregen bij het onderzoek naar de waardplanten van *Tylenchus coffeae*. (Host plants of the coffee eelworm.)  
*Bergcultures*, 1941, 15: 1588-93, bibl. 4.  
 In attempting to rid land of coffee eelworm by the starvation method it would obviously be of advantage if some useful plant immune to this pest could be grown rather than that the ground should remain unoccupied. The Midden-en Oost Java Research Station here reports the results of extensive trials. The immune plants are very few. They consist of *Perilla ocymoides*, *Crotalaria alata*, *C. anagyroides*, *C. incana*, *C. usaramensis* (other crotalarias are not immune), *Eupatorium pallescens*, *Hydrocotyle asiatica*, *Leucaena glauca*, *Oxalis corymbosa* and *Salvia privoides* and *S. obscura*. *Perilla* is an economic crop, the remainder are variously classified as shade trees, green manures, cover plants and weeds. The apparent immunity of *Eupatorium pallescens* is gratifying on account of its value as a green manure. Long lists of other plants tested are given and are divided into two categories, namely doubtful and certain host plants.
626. MAYNE, W. W. 632.76: 633.73  
 Coffee stem borer [*Xylotrechus quadripes*].  
*Plant. Chron.*, 1942, 37: 31-4.  
 A review of the revised edition of, The coffee stem borer, by T. V. Subramanyam, *Ent. Bull. Dep. Agric., Mysore State* 11 (revised), 1941. The reviewer discusses the subject thoroughly in the light of his own experience, which is considerable.
627. MENDES, A. J. T. 633.73: 581.141  
 Cytological observations in *Coffea*. VI. Embryo and endosperm development in *Coffea arabica* L.  
*Amer. J. Bot.*, 1941, 28: 784-9, bibl. 17.
627. SCHWEIZER, J. 631.8: 633.73 + 633.912  
 Wat halen een koffie-en een rubberaanplant uit den grond en wat geven zij aan den grond terug. (What coffee and rubber plantations remove from the soil and what they return to it.)  
*Landbouw*, 1941, 17: 717-34, bibl. 23.
628. WEST, J., AND VOELCKER, O. J. 633.74  
 Plantation cacao in the British Cameroons.  
*Trop. Agriculture, Trin.*, 1942, 19: 4-11, bibl. 7.  
 An account of the plantation cacao in the British Mandated Territory, Cameroons. The methods used under German management are described (after 1925 most of the plantations were repurchased by the German companies). Yield is generally poor, largely because *Forastero*, the type grown, contains many self-incompatible types. Yields of young cacao planted between 1925 and 1935 are extraordinarily poor possibly because of its very slow development, attributed here to the practice of interplanting with other permanent crops and to the fact that cacao is not really suited by the environment. Black pod incidence varies with the locality from almost nil to 80%, chiefly on old cacao. The subject is discussed. Experimental work carried out by the German planters in recent years is briefly summarized. The Cameroons and Trinidad cacao industries are compared. The only means of maintaining soil fertility, artificial manure trials having failed, is by the use of shade trees.
629. POUND, F. J. 633.74-1.538  
 The replanting of cocoa fields.  
*Proc. agric. Soc. Trin. Tob.*, 1941, 41: 629-31, 633-5, 637-9, 641.  
 Young cacao thrives only under a very narrow range of conditions, which, however, can be reproduced by the provision of proper ground shade cover. Most failures can be traced to lack of adequate preparation before planting. A young tree in after life never seems quite to recover from early setbacks. This article details the work necessary for successful replanting of blocks of cacao in Trinidad and



Tobago. *Clearing land.* The undergrowth, especially hard weeds and grass, must be removed. Brushing alone is useless. *Lining.* Cacao tree sites should be lined out and picketed before felling any large trees on the site. Lining is useful in various ways but absolute accuracy as regards right angles is not essential. The diagonals must form straight lines. *Spacing.* Within limits future crop appears to be independent of the number of trees to the acre. Close spacing requires, when the trees are grown, less weeding, practically no pruning or overhead shade and there appears to be less witchbroom infection on unshaded plots (at River Estate). In other words cost of production for the same yield is less on closer than on wider spaced cacao. A spacing of 8 ft. in one-acre blocks each surrounded by a good windbreak is recommended. An experimental layout is mentioned in which 100 budded cacao, 10 ft. apart, are surrounded by a ring of coffee 10 ft. from the outside row and a ring of tonka bean 10 ft. from the coffee. The coffee forms a hedge, the tonka bean a windbreak and all are economic plants. *Holing.* Marking holes 1 ft. each way are dug out before felling existing shade trees and old cacao. After felling and before replanting the hole is enlarged to 18 in. deep and 2 ft. wide, the excavated soil mixed with manures (if used) and replaced. *Felling.* Both old cacao and shade trees must be felled at the same time. Reasons for this are given. The debris quickly rots and in two years even large trunks will be sufficiently decayed to be broken up and used as mulch. Burning must never be carried out. *Groundshade.* Adequate groundshade is necessary to protect the young cacao and suppress weeds and insect pests. Unshaded young cacao does not thrive. Temporary shade can consist of bananas, planted a year previously, with cassava and tania to form successive lower canopies. Permanent groundshade, e.g. immortelles (*Erythrina* spp.), if used should be put in as early as possible before planting. A crop of corn can be taken at the same time. Varieties of permanent shade tree and their limitations are discussed. The use of fan cuttings supplied in baskets is assumed for the purpose of the planting. Very detailed instructions are given for setting the young cacao in the planting hole. *Regulation of groundshade.* When the young cacao plant is established, i.e. when it has sent out and hardened off a flush, groundshade must be reduced as much as is compatible with the non-appearance of grass. Gradually all groundshade is removed ending with the bananas, which stand till the cacao is 4-5 years old. *Mulching and soil cultivation.* After the initial forking at planting the cutting is mulched with 40-60 lb. well-rotted yard manure plus, in potash-deficient soils,  $\frac{1}{2}$  lb. sulphate of potash. The removal of ground cover provides sufficient cultivation for a time, later and in heavier soils the ground should be forked to provide a tilth for the roots as they spread. The yard manure, if available, should be provided annually together with a small dressing of mixed fertilizers, including sulphate of ammonia. On reaching full bearing the sulphate of ammonia should be discontinued as being then not generally useful. The future manuring programme will depend on soil deficiencies. *Permanent shade.* Where interplanted with cacao, as under the old system, permanent shade will need some thinning out after 8-10 years. Earlier lower branch trimming will be necessary to avoid interference with the cacao. *Pruning.* Not usually necessary except that where a trunk is preferred to a bush-like form the lower branches can be cut.

630. POSNETTE, A. F. 633.74: 581.162.3  
Natural pollination of cocoa, *Theobroma leiocarpa*, on the Gold Coast.

*Trop. Agriculture, Trin., 1942, 19: 12-6, bibl. 8.*  
From data obtained during three years' investigation on the Gold Coast it seems certain that day-flying insects, probably thrips, are the chief pollinating agents of cacao flowers. One species of ant out of five tested caused pollination on caged and banded trees.

631. OROZCO C., J. M. 633.825  
El jengibre (*Zingiber officinale* Roscoe). (Ginger.)  
*Rev. Dep. nac. Agric. (D.N.A.) Costa Rica, 1940, 5: 489-93, bibl. 2.*

The cultivation of ginger in Costa Rica, particularly by smallholders, is advocated with a view to starting a new industry. In parts of the country the plant is already naturalized and found growing wild in large stretches in river woodland in certain districts. Notes on cultivation are given.

632. MENDEZ, R. 633.853.74-2.4  
Estudio sobre un daño fungoso del ajonjolí en Costa Rica. (A fungous disease of sesame in Costa Rica.)  
*Rev. Dep. nac. Agric. (D.N.A.) Costa Rica, 1940, 5: 426-32.*

Sesame in parts of Costa Rica was attacked by the fungus *Cercospora sesami*. Control measures are suggested, namely, that all seed known to have come from the infected plantings should be burnt, that in future disinfection of the seed by approved methods should be a routine matter, while infected land should not be planted with sesame for 3 or 4 years. Attention should also be paid to the choice of localities in which soil and climate are suited to the crop, and to spraying immediately the fungus makes an appearance. Some writers even recommend three preventive sprayings with bordeaux mixture at 3- to 4-weekly intervals beginning when the plants are 20-30 cm. high.

633. BECKLEY, V. A. 633.88  
Empire production of drugs. III. Ephedrine.\*  
*E. Afr. agric. J., 1941, 7: 69-71, bibl. 1.*

Attempts to establish *Ephedrine* spp. as cultivated sources of ephedrine in Kenya are described. With some difficulty a sufficient number of plants were grown from seed to distribute to various cool zones. Reports now received indicate that climatic conditions in Kenya are unsuitable to *E. sinica*, that *E. intermedia* and *E. gerardiana* will thrive under many conditions in the country and that none of the species so far tried will tolerate wet or humid conditions. It is hoped to be able to work up a large planting stock of *E. gerardiana*, the most promising variety so far tried.

634. O'BRIEN, T. E. H. 633.912  
Some wartime problems of the rubber industry.  
*Quart. Circ. Ceylon Rubb. Res. Scheme, 1941, 18: 87-98.*

Maximum wartime production of rubber in Ceylon is urged and at least 100% tapping intensity should be maintained. Many estates could tap at still higher intensity without risk and for them the double three, 2s/2, d/3, 133% is recommended. Bark consumption is about 8  $\frac{1}{2}$  inches per annum. Another useful system giving an increased yield is the half spiral alternate daily system in which the two sides of the tree are tapped alternately, there being thus a 4-day interval between the tappings of each cut, s/2, d/2, (2  $\times$  2d/4), 100%. Felling for replanting with improved clones should be postponed till after the war and meanwhile a reserve for accelerated replanting when the demand falls off could be built up. Experiment has shown that stumped buddings as planting material develop more quickly than budded stumps or field buddings. Factors making for maximum success are the use of well grown stumps budded at 18 months and planted out 2 years later when girth is about 6 inches. Side roots should not be cut within 12 inches of the tap root. In planting the earth should be replaced in layers of 6 to 8 inches and each layer trodden well in. This precaution will save many trees if drought occurs shortly after planting. Some clones have a tendency to die back and are not so suitable. Sun scorch, if planting in dry weather, should be guarded against by draping the stems with creepers or possibly by whitewashing. Mature *Hevea* in Ceylon requires periodical fertilizer applications,

\* Stramonium, *H.A.*, 11: 936; Camphor, *H.A.*, 11: 1414.

especially with nitrogen, to keep it in health. Sulphur dusting for Oidium should not be discontinued as long as sulphur is available. The remainder of the paper is concerned with factory work.

# 635. RUBBER RESEARCH SCHEME (CEYLON).

633.912: 633/635

Cultivation of food crops in young rubber areas.  
*Advis. Circ. Ceylon Rubb. Res. Scheme 15*, 1941,  
pp. 2.

In order to make full use of young rubber areas up to 2 years old for food crop growing, the authorities recommend a regular cropping rotation for which they advise 24 named plants, stipulating that no food plant shall be grown within 4 feet of any rubber plant and that certain other named soil-conserving operations shall be carried out.

# 636. RUBBER RESEARCH SCHEME (CEYLON). 633.912.1.8

Programme of manuring for replanted rubber clearings.  
*Advis. Circ. Ceylon Rubb. Res. Scheme 2*, revised 1941, pp. 3.

On account of wartime shortage of fertilizer supplies it is recommended that phosphate alone should be applied in young areas where the standard of growth is satisfactory. Backward trees, provided the shortage of nutrients is the factor responsible for poor growth, should have a complete fertilizer. Satisfactory growth is held to be an annual girth increase of 3 inches in wet low-country districts and 2½ in. in dry districts and at higher elevations. A manurial programme covering the first 7 years is given for areas of satisfactory growth.

# 637. HASSELHUHN, E. T. 633.912

Straight planting on undulating land.  
*Plant. Bull. Rubb. Res. Inst. Malaya*, 1941, No. 18,  
pp. 1-2.

A method is described of straight planting rubber on undulating land in such a manner that erosion is prevented and movement through the plantations is unhindered. In such case straight planting is cheaper than contour planting and management of the estate is simplified. The trees are planted in rigidly straight lines on platforms 8 ft. wide with an inward tilt of 1 in 5. The platform is formed by cutting 4 ft. back into the slope and consolidating the earth so cut out on the front edge of the platform, thus extending it by 3 ft. The distance between plants in the rows must be 10 ft. since less would mean too close planting and more would hinder movement by making the steps between the platform too long. Distance between the rows is as desired, 22 ft. to 25 ft. being convenient. Between the platforms, i.e. about every 8 ft., continuous contour paths are made, the platforms representing steps between. This type of planting is unsuitable if the slope is greater than 1 in 4. Illustrations help to clarify the description.

# 638. VAN DER BIE, G. J. 633.912-1.541.11

Een vergelijkend onderzoek van de eigenschappen van de rubber, verkregen van oculaties op onderstam van *Hevea spruceana* hybride en van *Hevea brasiliensis*. (A comparison of the properties of rubber obtained from buddings on stock of *Hevea spruceana* hybrid and of *H. brasiliensis*. (English summary 8 lines.)  
*Arch. Rubbercult. Ned. Ind.*, 1941, 25: 271-93,  
bibl. 3.

Chemical analysis and comparative tests on plasticity, vulcanization, swelling capacity and accelerated ageing show little difference between the rubber from buddings on *Hevea spruceana* hybrids and those on *H. brasiliensis*. The former has a lower plasticity and shows after vulcanization a higher modulus which, for some purposes, should be an advantage. The rubber has a higher modulus only when the distance from tapping cut to junction is at least 20 cm. [From author's summary.]

# 639. DE SILVA, C. A. 633.912-1.566.8

Field experiments on Dartonfield Estate. XV.  
Comparison of tapping systems (1940).  
*Quart. Circ. Ceylon Rubb. Res. Scheme*, 1941,  
18: 58-69.

The results of eleven tapping systems are compared. The satisfactory yield of the "double three" system is outstanding, i.e. two opposite half spiral cuts once in three days, 2s/2, d/3, 133%. The system is not for use on trees already depleted of bark reserves. The less intensive methods continue to show a substantial increase over the theoretical expectation of yield, confirming the benefit of a periodic rest or increased interval of tapping.

# 640. VAN SCHOONNEVELDT, J. C. 633.912-1.556.8

Tapproeven met twee sneden bij oculaties.  
(Double-cut tapping tests on budded rubber.)  
(English summary 1 p.)  
*Arch. Rubbercult. Ned. Ind.*, 1941, 25: 401-16,  
bibl. 8.

A description is given of tapping experiment No. 366 on the Bodjong Datar Estate in West Java. In 2 years, 1939 and 1940, the yield of the double-cut system exceeded that of the single-cut system by 34% and 32% respectively. The results are supported by figures from a similar experiment, partly on the same clones, which ran for 7 years. Details of cost show the economy of the double-cut system which is now regarded as suitable for permanent use. There appears to be no difference in yield whether the 2 tapping cuts are situated in direct line one above the other or in echelon.

# 641. HUIZER, A. 633.912-1.556.8

Voorloopig resultaten van eenige hoogtapproeven.  
(Provisional results of some high-tapping trials.)  
*Bergcultures*, 1941, 15: 1276-84.

Proefstation Midden-en Oost-Java en Besoekisch Proefstation. 633.912-1.556.8

Resultaten eener enquête over hoogen tap bij onverdeelde oude zaalingaanplantingen in de ressorten der Proefstations Midden-en Oost-Java en Besoeki. (Results of an investigation of high tapping on old unimproved seedling plantations in the spheres of influence of the Midden-en Oost Java and Besoeki Research Stations.)  
*Bergcultures*, 1941, 15: 1320-41  
Analysed data from 21 estates.

# 642. HAMILTON, R. A., AND PILLAY, K. S. 633.912-1.874

The manuring of *Centrosema pubescens*.  
*J. Rubb. Res. Inst. Malaya*, 1941, 11: 25-43, being  
*J.R.R.I.M. Commun.* 255.

Two manurial pot experiments were conducted with the cover plant *Centrosema pubescens*. 1. Nitrogen (sulphate of ammonia) depressed growth and nodulation but increased nitrogen content of the plants. Phosphorus (superphosphate) increased growth considerably, potassium slightly so; smoke house ash depressed growth. 2. Basic slag gave by far the best results over 6 other phosphates. In this experiment heavier dressings of superphosphate appeared to depress both growth and nitrogen fixation. The importance of nitrogen fixation in cover legumes is pointed out. In its absence the cover plants compete with the main crop, in this case rubber.

# 643. ANON. 633.912-1.56

Shed for drying scrap and lump rubber.  
*Plant. Bull. Rubb. Res. Inst. Malaya*, 1941, No. 16,  
pp. 1-4.

Details of construction and plan are given of a shed designed at the R.R.I. Experiment Station for drying scrap and lump rubber. The materials to be used are such as can be easily obtained locally.



644. VERBEEK, F. A. T. H. 633.912-2.654.2

Bestrijding van mijten op jonge hevea. (Control of mites on young hevea.)

*Bergcultures*, 1941, 15: 1535-7.

Sulphur dusting is recommended. "Mite attack can also be prevented or much reduced by the provision of adequate shade.

645. EASTWOOD, H. W. 634.4: 551.566.1

The *Monstera deliciosa*.

*Agric. Gaz. N.S.W.*, 1942, 53: 23-4.

*Monstera deliciosa* produces a unique edible fruit seldom seen on the market. In cultivation it is usually treated as a climber but can be grown equally well without support. Its native climate is hot and moist but the plant is very adaptable. Propagation is by cuttings of two or more segments set horizontally in the soil and covered lightly. The fruit is ready to be picked 12 months after blossoming; fruiting and flowering are more or less continuous. The 9-inch stem is retained on the fruit by cutting it close to the vine. The fruit is fit to cut when its ground colour changes to a lighter green and the interstices between the scales begin to open and show a paler colour. After picking the fruit remains unfit for eating until the hexagonal scales have fallen off, a process starting from the base upwards and taking 6 days to complete. It is usual to wrap the fruit in paper to obtain more uniform ripening. A common though less satisfactory method is to place the stems in water. The pulp is soft, with an agreeable sweetish taste and a delicate aroma. The crystals of calcium oxalate found in the fruit may irritate sensitive throats. For market the fruit is graded to size and shape and space packed in half-bushel cases, leaving 4 inches of stem on the fruit. Vigour and cropping of the vines are greatly improved by cultivation and attention.

646. NAIK, K. C. 634.441-1.532/541

Studies on the propagation of the mango, *Mangifera indica* L.

*Indian J. agric. Sci.*, 1941, 11: 736-68, bibl. 21.

The experiments of which the results are reported here cover a period of 5 years and were undertaken at the Fruit Research Station, Kodur, Madras Province, of which the author is Superintendent. It is safe to say that no previous publication has contained so much first-hand information on the propagation of the mango or has considered so many aspects of the problem. *Polyembryony*. Although the Indian mango is commonly believed to be monoembryonic a number of polyembryonic varieties were discovered in South India. They produced up to 5 embryos and some of them gave a high percentage of germination. Bellary is likely to be the most favoured variety. *Seed sowing*. Distorted stems rendering the seedling unsuitable as a stock for inarching result from sowing unshelled stones, but shelled stones are expensive and often germinate poorly. By sowing unshelled stones with the plumule upwards a straight taproot and stem will be obtained. *Seed selection*. Size of fruit or of stone had no influence on vigour or germination, but the selection of seed parents which produce inherently vigorous progeny will shorten the pre-inarching period. *Transplanting*. Mango seedlings can be transplanted with naked roots if the roots are not allowed to dry during the operation. If 7 to 9 days before lifting for potting the seedlings are defoliated with the exception of two leaves in the terminal rosette, mortality will be reduced to a minimum even in hot weather. *Watering*. Daily hand watering of potted seedlings can be avoided by keeping them close together in a trench and irrigating it up to the edge of the pots every 3 to 5 days. *Inarching*. Stocks can be inarched as young as 4½ months. The older rootstocks do not necessarily produce larger grafted plants than younger stocks. The ages tested were 10½, 13½ and 16½ months. Varietal differences exist as regards degree of successful response to inarching. The weather conditions also have

an influence. There are varietal differences in optimum time for separation of inarched grafts from the parent tree, e.g. Neelum and Bangalore can be separated 3 months after the operation while Rumani requires 4 months. In certain seasons grafts planted out immediately after separation flushed sooner than those retained in the nursery. *Root-grafting* (to eliminate stock influence). This was successfully carried out by repotting previously potted seedlings in such a manner that 2 to 3 inches of taproot below the collar remained above the soil. The pot bore a U-shaped notch, against which the root was placed to facilitate the approach of the scion. There was a high mortality on repotting with exposed root but a good take among the survivors. *Other propagation methods*. The relative percentages of success obtained by various methods of propagation are instructive. Variety Neelum: rootgrafts, 23·81; double worked, 54·11; inarched, 84·42; shield budded, 71·06; patch budded, 67·57; cleft grafted, 0·85. There appears to be varietal differences in response to the various methods. Side grafting with greenwood as advocated by Nakamura (*H.A.*, 1939, 9: 1428) was very successful except in rainy weather. Scions from the apical regions, particularly those of 0·5 cm. and over were superior to scions from lower down, especially to thinner ones. Mound-layering after etiolation was unsuccessful. Hardwood cuttings occasionally rooted but so seldom as to make the method useless. Treatment with growth substances was ineffective.

647. ROY, S. C. 634.441-1.8

The manuring of mango trees: the present position.

*Indian Fmg.*, 1941, 2: 575-8, bibl. 8.

Recommendations are quoted from the works of a number of authorities (some recent, some less so) on the manuring of mango trees in various parts of the world.

648. MENDES, J. E. T. 634.442

O jocote (*Spondias mombin*). (Yellow mombin.)

*Rev. Agric. S. Paulo*, 1941, 16: 358-61, bibl. 1.

The yellow mombin, a species of hog plum, has after several attempts been successfully introduced into Brazil. The species shows much variation and should be capable of improvement. It reproduces without difficulty from cuttings [of mature wood.—Ed.].

649. KADEN, O. F. 634.6

Die Ölpalmbestände Bahias und ihre Nutzungsmöglichkeiten. (Oil palms of Bahia and their possible exploitation.)

*Tropenpflanzer*, 1940, 43: 177-83.

It has been established that the oil palm, *Elaeis guineensis*, was introduced into Brazil by the slaves brought from Africa. At present most of the little oil produced is used locally. The types of oil palm found in Bahia are classified as follows:—1. Var. *communis*, form "Dipobe" (Annet): var. *macrocarya* = Congo type (Rutgers and Yampolsky). 2. Var. *communis*, form "Liscombe" (Annet): var. *dura* = Delitope (Rutgers and Yampolsky). 3. Var. *communis*, form "Liscombe" (Annet): var. *tenera* = Liscombe type (Rutgers and Yampolsky). 4. Var. *virescens* (A. Chevalier). 5. Var. *pisifera* (Annet, Rutgers and Yampolsky). The methods of oil extraction and the economics of production are briefly described.

650. BONDAR, G. 634.61

Palmeiras do genero *Cocos* e descrição de duas espécies novas. (Palms of the genus *Cocos* and a description of two new species.)

*Bol. Inst. cent. Fom. econ. Bahia*, 9, 1941, pp. 53, bibl. 16.

Notes and descriptions are given of a number of palms of the genus *Cocos* native to Brazil. Those receiving special attention are *C. campestris*, *C. picrophylla*, *C. getuliana* and *C. ruschiana*, the two last being new species.

651. GEORGI, C. D. V. 631.83: 634.61-1.56  
Ash from coconut and oil palm waste products as a substitute potassium fertilizer.  
*Malay. agric. J.*, 1941, 29: 426-36, bibl. 5.  
Coconut husk ash and oil palm bunch refuse from the field are better sources of potassium than oil palm bunch refuse from the factory. Incineration should be at as low a temperature as possible and the ash should be kept dry. The incineration of husk should not over a few years have any appreciable adverse effect on palms growing on coastal clay soils as far as the removal of potassium is concerned. However, unless wilting and bronzing of the leaves is absent and experiments have shown the application of potassic fertilizers to be without effect as regards increasing yield on a particular soil type, ash should not be manufactured and sold off the estate. [From author's summary.]
652. SIMPSON, H. J. 634.61-1.55  
Picking versus natural fall in coconut harvesting.  
*Malay. agric. J.*, 1941, 29: 395-8, bibl. 2.  
A change over from monthly picking of coconuts to natural nutfall resulted in a temporary reduction in nuts matured, owing to natural fall nuts remaining on the palms a month or so longer than picked nuts. Thereafter long continued nutfall did not result in a reduction of the number of nuts but the yield of copra was reduced owing to germination taking place both on the palm and in storage. The loss was about 8%. On the other hand, as is pointed out in the editorial, natural fall reduces collecting costs. The question which is the more economic is a matter for individual estates.
653. JAYARATNAM, T. J. 634.61-2.78-2.96  
The bethylid parasite (*Perisierola nephantidis* M.) of the coconut caterpillar (*Nephantis serinopa* Meyr.).  
*Trop. Agriculturist*, 1941, 97: 115-25, bibl. 3.
654. NORTH-COOMBES, A. 634.774  
Experiments with pineapples 1937-40.  
*Bull. Dep. Agric., Mauritius (sci. Ser.)* 27, 1941, pp. 19, 25 cents.  
A brief note of some work carried out at the Pineapple Experiment and Demonstration Station, Mauritius, 1937-40. *Results*. Spacing at 9,000-11,000 instead of 6,220 plants per acre increased yield from 5 tons to 8 tons per acre. Liberal manuring especially with sulphate of ammonia gave good results. Clean weeding and clean lands are necessary. The quality of the planting material is important. Paper mulching is uneconomic. Lands unsuitable for sugarcane will not grow pineapple. The best method of upkeep is to make a labourer or group of labourers responsible for a definite area. Small plantations of 4-5 acres are uneconomic; the crop is unsuitable for the smallholder. Spraying with diesel oil-clay emulsion against mealy bug is essential.
655. POPENOE, W. 634.8: 551.566.1  
Grapes for tropical America.  
*Trop. Agriculture, Trin.*, 1942, 19: 23-8, bibl. 5.  
A short history is given of early attempts to introduce and cultivate the grape vine in tropical America. The various types of grape are briefly reviewed, namely, the European *Vitis vinifera* types, the American bunch grapes developed from various native species with the aid of hybridization, natural or controlled, with the European grape, and muscadine grapes which are horticultural forms of *V. rotundifolia*. The Isabella grape, probably of *V. labrusca* and *V. vinifera* parentage, was the first grape to indicate viticultural possibilities in the American tropics. It is grown commercially in the Cauca valley of Colombia at 3,000 ft., producing 2 crops a year. An account is given of the local methods of cultivation. The plant is highly disease-resistant. Of grapes introduced into Guatemala by the author 10 years ago none has equalled Isabella except Niagara which has done well enough to be worth propagating and distributing. Mr. J. L. Fennell\* has provided the author with notes on "known *Vitis* species of greatest promise for the development of hot-humid climate viticulture", 6 species in all being discussed. In conclusion a report from Fennell is quoted in which he says that while no *vinifera* variety has yet succeeded in S. Florida (which has practically a humid tropical climate) and few varieties survive the first summer, several F<sub>1</sub> hybrids of certain *vinifera* sorts with wild Florida selections seem perfectly at home.
656. SAENZ MAROTO, A. 635.62  
El chayote (*Sechium edule*). (The christophine.)  
*Rev. Dep. nac. Agric. (D.N.A.) Costa Rica*, 1940, 5: 494-502, bibl. 5.  
The christophine (*Sechium edule*, *Cucurbitaceae*) is a trailing or climbing plant of which the fruit is much valued as a vegetable in tropical or subtropical countries. There are many horticultural varieties, some of which are described briefly in this paper. The usual method of planting in Costa Rica is to germinate the seeds in a cool moist place and to plant them out when the shoots are 2 cm. in length. In planting only two-thirds of the seed is covered, the base of the shoot being left free of soil to encourage quick growth. The plants are trained in groups of 3 or 4 over a special framework known as barbacoa on which they form a leafy canopy affording protection to the fruits below. Another method is to allow the plants to trail on the ground without the use of stakes. The distance between rows is from 3 to 4 yards and between plant groups 2½-3 yards. The seeds are sown in July and harvesting can begin 3 or 4 months later. The constant care needed to ensure the plants being properly trained is the most expensive item. Plants allowed to run wild are liable to suffer sun scorch in fruit or young shoots. The christophine has few diseases and is completely resistant to the mildew which so often attacks other members of the family.
657. AYYANGAR, G. N. R., AND NAMBIAR, K. K. K. 635.65  
Lablab—the garden bean.  
*Indian Fmg*, 1941, 11: 469-72.  
Notes on the cultivation of *Dolichos lablab*. A large number of forms exist, 120 constant morphological types having been isolated out of a collection of 300 samples at the Millets Breeding Station, Coimbatore. A few of the most economic selections are described and illustrated. Attention has been paid to flavour and stringlessness.
658. BURNS, W. 635.655  
The soybean—its politics, performances and possibilities.  
*Indian Fmg*, 1941, 2: 451-8, bibl. 18.  
The world production of soybean is reviewed. The crop is grown in India but its development is hindered by the low export prices (before 1938) and the fact that it is not popular as an article of diet in India nor, according to the Nutrition Advisory Committee of the Indian Research Fund Association, has it any advantage over the various pulses commonly eaten there. In places where no pulses are grown, i.e. over 5,000 ft. and in places liable to waterlogging soybean could be grown with advantage.
659. VERMAAT, J. G. 631.42  
Uniforme grondmonsternamen ten behoeve van het landbouwkundig onderzoek. (Uniform soil sampling in aid of agricultural investigations.) (English summary 12 lines.)  
*Arch. Theecult. Ned. Ind.*, 1941, 15: 263-83, bibl. 5.  
MIDDLEBURY, H. A. 631.452: 631.416  
De fosfaattoestand als vruchtbaarheidskenmerk van den grond. (Phosphate content as an indicator of soil fertility.)  
*Landbouw*, 1941, 17: 580-96, bibl. 18.

\* See *J. Hered.*, 1941, 32: 193-7; *H.A.*, 11: 1138.



- DE JONGH, P. 631.847  
Leguminosens en *Rhizobia*. (Leguminous plants and root nodule bacteria.)  
*Landbouw*, 1941, 17: 844-59, bibl. 10.
- REGE, R. D. 633.61  
Sugar cane research in the Bombay-Deccan.  
*Emp. J. exp. Agric.*, 1942, 10: 43-56, bibl. 3.
- MCINTOSH, A. E. S. 633.61-1.523  
Recent developments in sugar cane breeding in Barbados.  
*Emp. J. exp. Agric.*, 1942, 10: 31-42, bibl. 7.
- HUTEMA, W. K. 633.841  
Pepercultuur en bodemvruchtbaarheid der Bangkagronden. (Pepper cultivation and the fertility of the soil types at Bangka, Dutch East Indies.)  
*Landbouw*, 1941, 17: 748-73, bibl. 32.
- WALLACE, G. B. 635.65: 632.3/4  
Yellow bean mosaic and notes on other bean diseases.  
*E. Afr. agric. J.*, 1941, 7: 114-5, bibl. 2.
- RAHMAN, K. A., AND ANSARI, A. R. 632.752  
Scale insects of the Punjab and North-West Frontier province usually mistaken for San José scale (with descriptions of two new species).  
*Indian J. agric. Sci.*, 1941, 11: 816-30, bibl. 11.
- BIERIG, A. 632.796  
La lucha con la zompopa. (Control of leaf cutting ants.)  
*Rev. Dep. nac. Agric. (D.N.A.) Costa Rica*, 1940, 5: 405-25, bibl. 7.

## STORAGE.

660. BRITTON, J. E., FISHER, D. V., AND PALMER, R. C. 634.11-1.55+664.85.11  
Apple harvesting and storage in British Columbia.  
*Finns' Bull. Canada Dep. Agric.* 105 (Publ. 724), 1941, pp. 39, bibl. 34.

This most useful bulletin, based not only on exact experiments at the Summerland Experimental Station during the last 20 years but also on the results of experiments in other fruitgrowing areas of the world, presents the problem of apple storage as an integral part of the whole of fruit growing practice. Apples grown under varying conditions from trees of unequal ages and carrying different loads give different responses to methods of storage. The manner in which the life processes continue during storage is partly predetermined by the environment of growth. An apple's storage life starts when it is picked. The first two sections of the bulletin indicate the cultural and harvesting practices which tend to produce fruit of high quality and good keeping characteristics, the third is concerned particularly with the technique of storage, and in the last section common storage disorders are discussed and illustrated. These disorders are watercore, Jonathan breakdown, mealy breakdown, soggy breakdown, brown core, soft scald, apple scald, bitter pit, Jonathan spot, shrivelling and fungal rots. Their causes and possible methods of prevention are noted. Finally a table is given showing maturity indices and best storage temperatures for 14 popular varieties. It is noted that North American workers prefer the term modified atmosphere storage to gas storage.

661. ANON. 664.85.11.037  
Moisture loss in apples.  
*Food Manuf.*, 1941, 16: 287.

Quoting from *Modern Refrigeration* (undated) the effect of cellophane containers on moisture retention and storage life of apples is discussed. Little or no loss of moisture occurred over several months' storage in apples so packed. Carbon dioxide was retained at a concentration of 3-9%, approximating to suitable gas storage conditions for many varieties of apple, e.g. McIntosh, Spy, and others. Cox's Orange Pippin did not store successfully unless a 7/16th inch hole was made in each bag. The type of container used at the Central Experimental Farm, Ottawa, where experiments are in progress, is a gallon, wedge-shaped bag with glued seams and tied at the top with a strong tag. The bags are packed in fours in a corrugated cardboard carton. The consumer is thus able to keep the apples in condition until the last has been used.

662. MAIER, W. 664.85.11-2.19: 546.27  
Stippigkeit und Bormangelkrankheiten bei Äpfeln. (Pitting and boron deficiency in apples.)  
*Gartenbauwiss.*, 1941, 15: 427-52.

Conflicting results have been obtained by different authors when trying to associate the disease known as bitter-pit, with

lack of boron. In the present paper it is pointed out that there are three other, non-parasitic diseases closely resembling bitter pit, namely lenticel-spot disease, internal cork, and drought-spot. While the last two are diseases due to boron deficiency, the others are not.

663. SINGH, U. B. 664.85.11: 632.48  
The soft-rot of apple fruit in Kumaun.  
*Indian J. agric. Sci.*, 1942, 11: 902-5, bibl. 2.

Soft-rot of apples in store in Kumaun is caused by *Penicillium expansum*. The symptoms are a characteristic musty odour accompanied by watery, light or yellowish brown areas. The morphology of the fungus is described. Infection can only enter through wounds or abrasions on the skin of the fruit.

664. ANON. 664.85.11+664.85.13  
Lagerungsversuche mit Äpfeln und Birnen. (Apple and pear storage experiments.)  
*Schweiz. Z. Obst- und Weinb.*, 1941, 50: 512-7 from *Terre Vaudoise*, Nov. 1941.

A full account of the experiments carried out by the Lausanne station on the cold and ordinary storage of apples and pears will be published in *Landwirtschaftliche Jahrbücher der Schweiz*. Here only the conclusions are given. They include the following:—1. The necessity is stressed for hygiene in the orchard, in the packing room and in the store. 2. Fruit must be stored as soon as possible after picking, e.g. within 24 hours in the case of early apples and pears. 3. Generally speaking the best temperature for cold stored apples is between +2° and +4° C., the most suitable humidity for fruit stored in ordinary cellars is from 85% to 90%. 4. Waxing is strongly recommended for rough-skinned varieties of apple. 5. Particulars are given of the reaction to cold and ordinary storage of pears including Passe Crassane, Beurré Diel, Duchesse d'Angoulême, Bergamotte d'Esperen, Louise Bonne. 6. Similar details are given regarding apples including Belle de Boskoop, Canada Reinette, Ananas Reinette, Winter Banana, Cox's Orange Pippin, Ontario, Jonathan, Delicious, Granny Smith.

665. LAL SINGH AND HAMID, A. 664.85.13.037  
The cold storage of pears (Bartlett) in the Punjab.  
*Indian J. agric. Sci.*, 1941, 11: 769-77, bibl. 18.

The problem with pears in the Punjab is to get them to the plains in an eatable condition, local demand being small. Investigations on cold storage of Bartlett pears were undertaken in Lyallpur during 1938 and '39. Maturity tests indicated that fruit should be picked hard, green and mature except for the ripening processes, or at a pressure test of 16-18 lb. Precooling facilities are unavailable but, provided proper ripening and storage facilities exist at the receiving

end, this is not very material. The longest storage life was obtained with pears picked at the stage described and stored at 32° F. These kept for 5 months the first year and 4½ months the second year. Pears should not be retained in storage after they have turned full yellow. The ordinary storage diseases of Bartlett are described. The best ripening temperature for the fruit after storage, is 60°-70° F. For canning in India the pears should first be conditioned in cold storage which improves the flavour and helps to ensure a uniform condition of maturity.

666. KIDD, F., AND WEST, C.

664.85.13.037 + 664.85.13.035.1

Refrigerated gas storage of fruit. V. Conference, Doyenné du Comice and Williams' Bon Chrétien pears.

*J. Pomol.*, 1942, 19: 243-76, bibl. 8.

This paper contains detailed results of experiments since 1934 at the Ditton Laboratory on the storage of Conference, Doyenné du Comice and Williams' pears. Among results of practical importance are the following:—A very considerable extension of storage life can be obtained by the use of atmospheres containing lower percentages of oxygen (2.5 to 10%) and higher percentages of carbon dioxide (5 to 10%) than those normally present in air. Temperatures down to 31.5° F. can safely be used, though in such cases fruit must be carefully watched in different parts of the store to avoid risk of local freezing. Pears in cold store or in refrigerated gas store should not be wrapped in oil papers. Wrapping does more harm than good. Pears intended for storage are gathered in a hard, green and inedible condition. In cold store or refrigerated gas store very little change takes place in the ground colour of the skin or the consistency of the flesh. Important changes do, however, take place and these if allowed to go too far lead to failure of the fruit to ripen after removal from storage. The danger point is usually indicated by a very slight change in ground colour and a colour chart is included in the paper showing the shade of colour denoting the point at which Conference pears need to be removed from store. The limits of storage life under conditions of the experiment are given for pears stored at different temperatures and in different atmospheres. The limits of temperature for satisfactory ripening are given for each variety and the importance of this temperature, which should be neither too high nor too low, is stressed. Pears need to be stored soon, i.e. within 4 to 5 days after picking. From the practical point of view the latest possible gathering combined with the utmost speed in bringing the fruit under the desired storage conditions is recommended. In the hard green condition in which pears are removed from store there is little risk of damaging the skin as in the case of ripe pears. An interesting observation was made in the last season's work, namely that many of the Conference pears developed in this season without seeds and with only a rudimentary core. The fruits concerned were found to have a respiratory activity both in the climacteric and the preclimacteric phase much above what is normal for that variety. It was also found that some 33% of these seedless pears developed brown heart even when submitted to CO<sub>2</sub> atmospheres otherwise found most suitable for Conference. As the authors say, these observations clearly need to be followed up.

667. HALL, E. G.

664.85.22.037

Cool storage of plums.

*Agric. Gaz. N.S.W.*, 1941, 52: 636-7.

The early Japanese plum Wilson has a cool storage life of under 3 weeks and is therefore unsuitable for export. The best storage temperature for local markets is 32° F. Over-storage prevents normal ripening after release. President will keep up to 5 weeks at 32° F., being inferior in this respect to Grand Duke, which will keep for 7. Both periods are the maxima reached in experiments during the last 4 years,

carried out by the Council for Scientific and Industrial Research and the Department of Agriculture, N.S.W. For export of Grand Duke, which alone of the three is really suitable, the dual temperature technique is advised, whereby the temperature is raised from 32° F. to 45° F. (slow ripening temperature) for the last two weeks of the voyage. This prevents the effects of overstorage but causes softening due to ripening to set in. Unfortunately the English trade is prejudiced against plums at all soft on arrival.

668. ANON.

664.85.31

Storage of sweet oranges.

*Agriculture and Forestry Notes*, 1941, No. 12, pp. 4-5.

The Division of Plant Pathology, Nanking University College of Agriculture, has succeeded in keeping sweet oranges in ordinary store for 6 months in perfect condition with a loss of 30 to 50% from storage rots as against a normal loss of 80% in 4 months under ordinary storage conditions. *Phomopsis* stem end rot and *Alternaria* internal rot were considerably decreased by decalysing with ethylene gas. Washing prior to storing with local chemical solutions (unspecified) showed that one of the mixtures used was six times more effective and five times cheaper than the standard borax wash. The treated fruits were wrapped in paper impregnated with tung oil and laid in single layers on bamboo trays placed on wooden shelves in a semi-underground store. The temperature and humidity were controlled by ventilation.

669. FORSCHUNGSGEMEINSCHAFT, MAGDEBURG.

664.85.11 + 664.84.34

Bericht über Vitamin C Untersuchungen an Äpfeln und Weisskohl. (Report on vitamin C investigations in apples and white cabbage.)

*Mitt. 51 Gemeinschaftsarbeit der RAG Landw. Gewerbeforschung des Forschungsdienstes*, from abstract *Forschungsdienst*, 1941, vol. 11, abstr. p. 107.

Both biological and chemical tests at Leipzig showed that, whereas during ordinary cellar storage apples lose their vitamin C, in cool storage [temperature not stated.—Ed.] it actually increases. There was no significant difference in effect of storing white cabbage at +5° C. and at -0.5° C.

670. PENTZER, W. T., AND BARGER, W. R.

634.872-2.482 + 664.85.8

A comparison of fungicidal treatments for the control of Botrytis rot of grapes in storage.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 281-4, bibl. 6.

Of a considerable number of volatile fungicides tried for the control of Botrytis rot of grapes in storage, sulphur dioxide fumigation consisting of 20 minutes' exposure to 1% concentration before the fruit was packed was the most effective. [Authors' summary.]

671. BENNETT, E.

664.84.25

The effect of storage on the carbohydrates of the Ebenezer onion.

*Proc. Amer. Soc. hort. Sci. for 1941*, 1941, 39: 293-4.

The largest percentage of marketable onions was obtained from the storage having the lowest mean temperature of those tried, namely 33-34° F., and the highest mean relative humidity, 85%.

672. UGANDA AGRICULTURAL OFFICERS. 664.84/85

The storage of native food crops in Uganda.

*E. Afr. agric. J.*, 1941, 7: 74-6.

The native methods of storage of millets, groundnuts, plantains, cassava, peas and beans and sesame are described, each product being dealt with by a different writer.



673. TODHUNTER, E. N., AND ROBBINS, R. C. 634.711: 577.16: 664.85.711.037  
**Ascorbic acid content of red raspberries preserved by the frozen-pack method.**  
*Food Res.*, 1941, 6: 435-44, bibl. 13.

The ascorbic acid content of frozen-pack red raspberries was determined by titration with 2·6 dichlorophenolindophenol, by the Evelyn photoelectric colorimeter and by the biological method, lower values being obtained by the last. Varietal differences were established, most of the varieties showing a content of from ·15 mg. to ·19 mg. per gram by the titration method, though the Antwerp variety contained ·35 mg. and the Washington ·21 mg. No appreciable difference was found in different years. There

was indication that the addition of sugar afforded protection to the ascorbic acid. There was little difference in ascorbic acid content on the moist-weight basis but on the dry-weight basis fresh berries contained more than frozen.

674. KARMAKAR, D. V., AND JOSHI, B. M. 664.85.441

**Respiration studies of the Alphonso mango.**  
*Indian J. agric. Sci.*, 1942, 11: 993-1005, bibl. 8  
 LEE, F. A. 664.84.656.037  
**Determination of the maturity of frozen peas.**  
*Industr. Engng Chem. (Analytical Edition)*, 1942, 14: 241, bibl. 1.  
 A revision of previous methods.

## PROCESSING AND PLANT PRODUCTS.

675. COSBIE, A. J. C. 663.4  
**Brewing: the story of a national industry.**  
*J. roy. Soc. Arts*, 1942, 90: 153-96, bibl. 19.

The Canton lectures, being a series of three lectures delivered before the Royal Society of Arts on November 17 and 24 and December 1, 1941. The author deals in turn with the raw materials, barley and its malting, and hops; with the brewing process in detail; and with recent research, with special emphasis on that done by the Carlsberg Research Laboratory, Copenhagen.

678. JENNY, J. 663.813  
**Die Wissenschaftliche Grundlagen der Süssmost-lagerung unter Kohlensäuredruck. Die Aufnahmefähigkeit der Säfte an Kohlensäure. III. Teil. (The scientific basis of fruit juice storage under CO<sub>2</sub> pressure. The coefficient of absorption of juices for CO<sub>2</sub>. Part III.) (French and German summaries.)**  
*Landw. Jb. Schweiz.*, 1941, 55: 623-56, bibl. 12.

The author in the trials here described has been studying mainly the CO<sub>2</sub> absorption capacity of juices under different conditions of temperature and pressure and the practical conclusions to be drawn from his experimental results. A suggestion is made that in the many establishments where both wine making and unfermented juice preservation are carried out the CO<sub>2</sub> produced in the manufacture of the wine might well be used for the preservation of juice, instead of being wasted as is generally, though not always, the case at present.

676. RIRIE, N. W. 613.2  
**The direct use of leaf protein in human nourishment.**  
*Chemistry and Industry*, 1942, 61: 45-8, bibl. 33.  
 A method whereby the amount of food produced in this country could be greatly increased is suggested, namely, that the conversion of part of the protein in leaves into human food could be more efficiently carried out by industrial chemical methods than by the ruminant. In this article only protein extraction is examined. Of the crops considered one of the most suitable appears to be grass. After extraction of 30% of the leaf protein the unextracted protein remains in the fibre and is still available as feeding stuff for cattle. The author claims that by treating more of our grassland intensively, and preparing protein from it for feeding to man, hen or pig, or for industrial uses the position of the cattle would remain substantially unaltered. The present knowledge on the subject is reviewed. The two main problems are (1) the maintenance of a supply of leaf material of high nitrogen content during several months of the year, and (2) the design of a suitable macerating plant.

679. CROCE, F. M. 663.813: 634.23  
**Elaboración de jugo de cerezas. (Processing of cherry juice.)**  
*Rev. B.A.P.*, 1942, 25: 290: 13-7.

The fruit qualities required for the manufacture of cherry juice are a reasonable sugar content, sufficient acidity to obtain a balanced product, a typical cherry colour, taste and aroma and a good yield of juice. The English Morello and Montmorency are suitable varieties. Two methods of juice extraction by which the colour may be preserved are described. Other operations dealt with are clarification, blending for flavour, canning, pasteurizing, carbonating and the preparation of beverages.

677. ANON. 633.813: 634.11  
**Canned apple juice: modern processing.**  
*Tin-printer Canning Ind.*, 1941, 16: 204: 21-2.

A short account of the recent work of R. E. Marshall of the Michigan Agricultural Experiment Station, on the processing of apple juice. A flattened tube flash sterilizer as used with success for citrus juices gave the best results in appearance and taste. The apparatus is briefly described. The best pasteurizing temperature was found to be 170° F., higher temperatures giving an inferior product. The containers are completely filled from the bottom, inverted or rolled on their sides and cooled in 30 seconds after closing to under 120° F. by rotation on their sides for 2 minutes, 100 revolutions per minute, under a spray of cold water. Prompt cooling is important. Methods of clarification are discussed, the most satisfactory being the enzymic method which is, however, expensive. It is pointed out that apple juice thus processed is not sterile, but the yeasts are killed, the mould organizations are checked by the absence of air and the surviving bacteria cannot grow in apple juice. De-aeration was not found to improve flavour or appearance and is regarded as unessential.

680. HAMBURGER, J. J., AND JOSLYN, M. A. 663.813: 634.3  
**Auto-oxidation of filtered citrus juices.**  
*Food Res.*, 1941, 6: 599-619, bibl. 42.

681. ANON. (CHACE, E. M.) 664.85.047 + 664.84.047  
**Fruit and vegetable drying in America.**  
*Food Manuf.*, 1942, 17: 37-8, bibl. 5.

A short resumé of work on vegetable and fruit dehydration, as carried out in U.S.A. and details of a new drier. The article is based on U.S. Department of Agriculture Circular 619, 1941, Commercial dehydration of fruits and vegetables by E. M. Chace.

682. KHAN, K. M. A. 664.85.047 + 664.84.047  
**Drying of fruits and vegetables.**  
*Indian Fmg.*, 1941, 2: 461-4.

A simple technique for fruit drying suitable for small-holders is explained.

683. CRUESS, W. V. 664.85.21.047+664.85.25.047  
Experiments on drying unsulfured apricots and peaches.  
*Fruit Prod. J.*, 1942, 21: 135, 157.  
Experiments show that dipping cut peaches and apricots in brine, pineapple juice or thiourea, does not prevent darkening of tissues of unsulphured fruit. They also show that steaming the fruit until cooked through or heating it in a cane sugar syrup or in a glucose corn syrup solution before dehydrating or sun-drying results in dried fruit of fairly good colour and exceptionally good cooking quality. Samples thus prepared and kept for 3 years at 48° F. are still of good colour, flavour and cooking quality. The author notes that since either treatment is somewhat troublesome and costly and since syrup-treated fruit tends to stick to wooden trays, such processes are likely to be limited in economic use to well equipped dehydrating establishments.
684. CROSBIE-WALSH, T. 664.84.047  
British vegetable dehydration for human food.  
*Food Manuf.*, 1942, 17: 30-2.  
An account is given of a successful project in vegetable dehydration for human consumption carried out by the Farmers' Marketing and Supply Company Ltd. A number of alternative methods of drying, all successful, are in use. Skill, patience and suitable labour are vital. A new potato project is under investigation whereby a potato powder can be manufactured that will reconstitute, by the simple addition of hot water, into mashed potatoes of normal flavour, appearance and digestibility. To achieve this a drying process must be used which does not cause the starch granules of the potato to burst. It is pointed out that with the exception of this potato product the appearance of the shredded produce is not such as to attract housewives while fresh vegetables are available but that the material can be and is being used by food manufacturers. At present costs are such that in England a dehydration plant could only pay its way, if used in conjunction with some allied business in which common overhead expenses could be shared. As an example of "where the money goes" it is mentioned that as much as 15 tons of water must often be evaporated to make only one ton of dried produce.
685. BECKLEY, V. A., AND NOTLEY, V. E. 664.84.047: 577.16  
The ascorbic acid content of dried vegetables.  
*Biochem. J.*, 1941, 35: 1396-1403, bibl. 3.  
Studies are reported from the Scott Laboratories, Kenya, on the ascorbic content and palatability of dried vegetables including cabbages, cauliflowers, beans, carrots and potatoes. Details of the methods used are described. Potatoes and cauliflowers need blanching before drying, while carrots, green beans and cabbages should be dried without blanching.
686. GRAHLE, A. 633.88-1.563.2  
Die Trocknung von Heilpflanzen. (The drying of medicinal plants.)  
*Dtsch. Heilpfl.*, 1940, 6: 9-11, from abstract  
*Forschungsdienst*, 1940, Vol. 10, abstr. p. 146.  
The method of drying medicinal plants is all important. Generally speaking the dried product is judged by its appearance, which in colour and shape should resemble that of the fresh plant as closely as possible. The water must be expelled as quickly as possible, but heating above 35° C. must be avoided. Evaporation is achieved by spreading in a very thin layer in the open air and in a draught, but not in the sun, which bleaches and has other harmful effects. Rules are given for drying procedure with notes on common faults. The amount of room required and the apparatus, hurdles, racks, etc., are discussed.
687. ATKINSON, F. E., AND STRACHAN, C. C. 664.85.035.78  
Preservation of fruits with sulphur dioxide in British Columbia.  
*Fruit Prod. J.*, 1941, 21: 5-8, 43-5, 60, 72-4, 110-2; and 1942, 21: 141-4, 153, bibl. 12.  
The preparation of the SO<sub>2</sub> preservative solution and the analysis of the solution and of fruit pulps are first described. The preservation of the following fruits is then considered in detail:—cherries, strawberries, raspberries, black currants, apples and zucca melons. Directions are given on the handling and storage of fruits so preserved. Finally summaries are given of work on the following problems:—effect of pH on cherry pigments; effect of pH on firmness of cherry tissue; maturity tests of dark varieties of cherries for processing; source of calcium for processing strawberries; effect of pH of preservative solution on firmness of berries; effect of maturity on suitability of apples for candying; and loss in weight in preparation of zucca melons.
688. SINGH, B. N., AND DUTT, S. 664.85.035.5  
Studies on the formation of jellies from some Indian fruits.  
*Indian J. agric. Sci.*, 1942, 11: 1006-21, bibl. 19.  
A quantitative estimation of acids, pectin, sugars and moisture of some Indian fruits is reported showing their degree of suitability for jelly making. The fruits concerned were *Feronia elephantum*, *Psidium guava*, *Carissa carandas*, *Hibiscus sabdariffa*, *Citrus nobilis*, *C. aurantifolia*, *Zizyphus jujuba*, *Musa paradisiaca*, *Aegle marmelos*, *Physalis peruviana*. Some excellent jellies were produced by mixing one fruit juice rich in pectin and acid with another having a good flavour. The methods used in the experiments are discussed.
689. LAL SINGH AND LAL, G. 664.85.13.036.5  
Semi-commercial trials on the manufacture of canned pears (Williams') and pear jam at Lyallpur.  
*Indian J. agric. Sci.*, 1941, 11: 652-7, bibl. 2.  
Details of picking, packing and transportation of Williams pears from Kulu, where they are grown, to the experimental canning plant at Lyallpur, 370 miles away, are given. The samples produced compared well with the canned pears usually available in England. Transport charges increased the cost greatly. Costs could be much reduced by the establishment of a cannery near the centre of production.
690. HUTCHINSON, R. C. 658.8: 634.61  
The copra industry.  
*New Guinea agric. Gaz.*, 1941, 7: 117-22, 283-92.  
A scheme for the sounder establishment of the copra industry in New Guinea is outlined. The basis of the scheme is (1) the local extraction of coconut oil by the most up-to-date methods; (2) the sale of all oil which cannot be disposed of for the manufacture of margarine and soap as a cheap liquid fuel, a suitable denaturant having first been added. Reasons are given to show why the practice of sending copra overseas for oil extraction is unsound. The method of oil extraction by the solvent process is described with specifications and illustrations of the machinery required. Suggestions for the location and operation of the mills are made.
691. TORRES, P. E. 634.61-1.56  
The commercial possibility of the Lava process (for the manufacture of coconut oil and by-products).  
*New Guinea agric. Gaz.*, 1941, 7: 293-7.
692. BAENS, L. 633.879-1.56  
Tannin from kernels of green betel nuts.  
*Philipp. J. Sci.*, 1941, 75: 363-7, bibl. 10.  
Investigations indicate good prospects for the production in the Philippines of tanning extract from locally grown betel nuts. The highest tannin content occurs in the nut when the kernel is just reaching maturity and the outside husk is still grass green. With trees of *Areca catechu* grown



8 feet apart there are 1,680 trees to a hectare. This should produce 1,556 kg. of solid betel-nut extract, containing 65·34 to 66·96% of tannin. This tannin is said to compare favourably with other tannins of local extraction and with those of foreign origin such as oak, chestnut, hemlock and myrobalan. For light weather tannage the quality is excellent.

693. WARD, G. M. 633.71: 581.192: 615.783.22  
**Nicotine, a product of tobacco.**  
*Tech. Bull. Canada Dep. Agric.* 38 (Publ. 730), 1941, pp. 21, bibl. 88.

A detailed account of the chemistry of nicotine is followed by a brief outline of its extraction and uses. It is noted that the nicotine content of tobacco is affected by varietal characteristics, fertilizer treatments, specific cultural practices, maturity, climate, etc. The references afford a good guide to those wanting to study any phase of the subject in greater detail.

694. ATTYGALLE, A. B. 633.71-1.56  
**Common mistakes in flue-curing of tobacco.**  
*Trop. Agriculturist*, 1941, 97: 126-8.

Instructions for managing the tobacco in the field so that it may arrive at the curing barn in the best possible condition are followed by a list of 19 points to be remembered when flue curing a barn of tobacco.

695. ROBERTS, E. A. H. 633.71-1.56  
**Investigations into the chemistry of the flue-curing of tobacco.**  
*Biochem. J.*, 1941, 35: 1289-97, bibl. 12.  
 Work at Toklai.

696. KELSALL, A., AND PORTER, S. A. 634.11-1.563.5  
**Feeding surplus apples and apple by-products to livestock.**  
*Seventy-seventh A.R. Nova Scotia Fruitgrs' Ass. for* 1940, 1941, pp. 110-5.

TILLER, L. W.  
**Ensilage from apples.**  
*Orchard. N.Z.*, 1941, 14: 12: 2.

- KELSALL, A., AND PORTER, S. A.  
**Feeding of apple products to livestock.**  
*Seventy-eighth A.R. Nova Scotia Fruitgrs' Ass. for* 1941, 1942, pp. 34-7.

An account of trials at the Experimental Station, Kentville, N.S. Apples fed green proved unsatisfactory. Fresh apple by-products proved quite satisfactory as succulent feeds for different kinds of stock. Dried apple products also proved their value. Ensilage made from whole apples and timothy hay in a ratio of 80 to 20 was found too acid and rather dry. However, it compared fairly favourably with corn ensilage when fed to milking cows at the rate of 40 lb. per animal per day. Trials are being made of an ensilage made from whole apples and clover hay in the ratio of 88 to 12 with an admixture of a little limestone. Ensilage made from straight pomace was rather dry, while that from straight skins and cores was too wet. Despite this both made good ensilage, were palatable and had a feeding value indicated as being as high or higher than fresh cut clover hay under the conditions of the experiment.

In the experiments reported in the second paper from Nova Scotia it was found that beef cattle fed 12 lb. apple silage hay, 2 lb. meal and 25 lb. freshly pulped apples gained 20% more in weight than cattle fed 12 lb. hay and 5 lb. meal. Further the feeding of silage made from apples and hay compared favourably with that of silage made from corn when given to cows in milk. There was also evidence that apple ensilage made from pomace, skins and cores is a fair supplement to pasture storage.

697. CHOPRA, N. N. 634.3-1.57  
**Utilization of inferior grades of citrus fruit.**  
*Indian Fmg.*, 1941, 2: 408-12, bibl. 1.

If the fruit industry, especially the citrus industry, is to expand, methods must be found for economically utilizing the surplus and lower grade fruits which will otherwise find their way on to the fresh fruit market to the detriment of all concerned. The manufacture of such products as essential oils, pectin, citric acid and salts, juices, beverages and preserves and finally cattle feed are in turn discussed, especially from the standpoint of their application to Indian conditions.

698. WOOLDRIDGE, W. R. 623.459: 613.2  
**The contamination of foods by poison gases, Pt. 1.**  
*Food Manuf.*, 1942, 17: 96-100.

The paper deals very thoroughly with the contamination of food, including horticultural produce, by various poison gases and the methods to be used in decontamination.

699. DAVIS, W. B. 577.16  
**Extraction of ascorbic acid from plant tissues.**  
*Industr. Engng Chem. (Industrial Edition)*, 1942, 34: 217-8, bibl. 5.

A short account is given of a new method of extracting ascorbic acid from all sorts of vegetable material, utilizing the Waring blender. The method appears to afford a considerable saving of time and trouble.

700. MORELL, S. A. 577.16: 581.192  
**Rapid photometric determination of ascorbic acid in plant materials.**  
*Industr. Engng Chem. (Analytical Edition)*, 1941, 13: 793-4, bibl. 7.

The method described is an adaptation and modification of the photometric determination of ascorbic acid in blood serum as reported by Mindlin and Butler and modified by Bessey to include coloured or turbid solutions and plant tissue extracts.

701. SCHUPHAN, W. 613.2: 635.1/7+634.1/8  
**Nährstoffgehalt und biologischer Wert von Gemüse und Obst. (Nutrient content and biological value of vegetables and fruit.)**  
*Forschungsdienst*, 1941, 11: 660-75, bibl. 4.

A discussion of the value of different common vegetables and fruits, especially the former, backed by tables of values with regard to the following ingredients:—Vitamin C, provitamin A, etherial oils, sugars and proteins. It is interesting to note the very high vitamin C content given for paprika, namely, 163·6 mg. per 100 g. fresh substance.

702. WARNE, L. G. G. 635.348: 577.16  
**Kohlraabi as a source of vitamin C.**  
 Reprinted from *Brit. med. J.*, 1942, Vol. i, p. 387.

The author points out that the vitamin C content of kohlraabi as determined by titration of a metaphosphoric-trichloroacetic acid extract with 2:6-dichlorophenol-indophenol is considerably higher than that of other root vegetables tested, averaging 56 mg. per 100 grammes for 4 samples and being thus comparable with watercress at 61 mg. per 100 grammes.

703. MURPHY, E. F. 635.25: 577.16  
**Ascorbic acid content of onions and observations on its distribution.**  
*Food Res.*, 1941, 6: 581-94, bibl. 14.

The amounts of ascorbic acid in 16 varieties of onion varied from ·17 mg. per gm. to ·40 mg. in fresh material. Small onions were found to contain more than large onions of the same variety. The central leaves have a much higher concentration than the outer leaves. Losses varying from 47 to 80% of the original values of the raw onion occur during home storage. Losses during cooking range from 10 to 65%.

704. MILLER, C. D., AND LOUIS, L. 634.57: 581.192+577.16  
**Chemical analyses and vitamin assays of *Macadamia* nuts.**  
*Food Res.*, 1941, 6: 547-52, bibl. 15.  
 Results show that commercially prepared, cooked (and salted) macadamias are a concentrated food (13 gm.= 100 calories) and a good source of calcium, phosphorus, iron and vitamin B<sub>1</sub>.
705. SHEETS, O., LEONARD, O. A., AND GIEGER, M. 635.3/6: 581.192+577.16  
**Distribution of minerals and vitamins in different parts of leafy vegetables.**  
*Food Res.*, 1941, 6: 553-69, bibl. 28.  
 Trials with a large number of common leafy vegetables show that on the whole green leaves contain more iron than bleached leaves, that the leaves and leaf blades contain more iron and other minerals than the petioles and stalks. The leaf blades, moreover, furnished 96.3 to 99% of the total carotene and 76 to 86.6% of the total vitamin C present in the whole leaves of the 12 different vegetables analysed.
706. ANON. 634.651-1.56  
**The conservation of activity in papain.**  
*Bull. imp. Inst. Lond.*, 1941, 39: 372-3.  
 A new process is mentioned whereby a product may be formed in which nearly all the original activity of the latex of the green fruit of *Carica papaya*, the papaw, may be retained for many months without apparent deterioration and the natural activator of the proteolytic enzymes, which occurs in the latex in considerable quantity remains in the papain. The process consists of adding common salt to the latex either before or after it has clotted, mixing thoroughly and partly drying the mixture, preferably in a vacuum and at a temperature not exceeding 55° C. With latex of average water content the amount of salt used may be about one-tenth the weight of the fresh latex. The evaporated product should be kept in airtight containers.
707. FULTON, C. C. 633.88.51: 581.192  
**Iodosulfate microchemical identification tests for cinchona alkaloids.**  
*Industr. Engng Chem. (Analytical Edition)*, 1941, 13: 848-50, bibl. 16.  
 The tests here described yield entirely different crystals with quinine, quinidine, cinchonidine and cinchonine.
708. BOOHER, L. E., HEWSTON, E. M., AND MARSH, R. L. 577.16: 581.192  
**Vitamin A assays of plant tissues: potential sources of error in sampling.**  
*Food Res.*, 1941, 6: 493-8, bibl. 5.
- SCHROEDER, C. W., AND LYTCHGOE, H. C. 663.3+661.731  
**Determination of lead content of commercial ciders and vinegars by spectrographic methods.**  
*Industr. Engng Chem. (Analytical Edition)*, 1941, 13: 829-30.
- GERRITZ, H. W. 634.1/7: 581.192: 546.32  
**Potassium in fruits and fruit products. Volumetric chloroplatinate method.**  
*J. Ass. off. agric. Chem. Wash.*, 1942, 25: 232-7, bibl. 11.
- HAMILL, G. K., AND SIMONDS, P. W. 663.39: 581.192  
**Detection of grape wine in blackberry wine.**  
*J. Ass. off. agric. Chem. Wash.*, 1942, 25: 220-6, bibl. 11.
- LOCONTI, J. D., AND KERTESZ, Z. I. 664.84.64.036  
**Identification of calcium pectate as the tissue-firming compound formed by treatment of tomatoes with calcium chloride.**  
*Food Res.*, 1941, 6: 499-508, bibl. 7.
- HOYNAK, S., POLANSKY, T. S., AND STONE, R. W. 633.74-1.56  
**Microbiological studies of cacao fermentation.**  
*Food Res.*, 1941, 6: 471-9, bibl. 7.
- LAMB, J., AND SREERANGACHAR, H. B. 633.72-1.56  
**Studies on the "fermentation" of Ceylon tea. The nature of the enzyme system. 2. Oxydizing enzymes.**  
*Biochem. J.*, 1940, 34: 1472-92, bibl. 23.
- SREERANGACHAR, H. B. 633.72-1.56  
**Studies on the "fermentation" of Ceylon tea. Respiration and tea fermentation.**  
*Biochem. J.*, 1941, 35: 1106-15, bibl. 16.
- ROBERTS, E. A. H. 633.72-1.56  
**The fermentation process in tea manufacture.\***  
 5. Cytochrome oxidase and its probable role.  
 6. The effect of dilution on the rate and extent of oxidations in fermenting tea leaf suspension.  
 7. The influence of external factors on fermentation rate. 8. The nature of the oxidase system. 9. The relation of tea fermentation to respiration.  
*Biochem. J.*, 1940, 34: 500-16, bibl. 22, 1941, 35: 909-19, bibl. 11; 35: 1209-24, bibl. 24.  
 Report on investigations at Toklai.

\* For previous parts see *H.A.*, 10: 765.

## NOTES ON BOOKS AND REPORTS.

709. KEEN, B., AND ARMSTRONG, J. 633.8  
**Herb gathering.**  
 Brome & Schimmer, Leather Market, London, 1941, pp. 51, bibl. 5, 9d.  
 This little book is designed to help those who feel that the war effort might be aided and possibly an honest penny turned by the collection and drying of wild medicinal herbs. It is, however, made clear that it will not be a case of strolling out on a nice day and culling a few flowers and leaves to dry by the kitchen fire. On the contrary it means work and quite a lot of it. It also means the acquisition of certain impedimenta which will cost money if not already in hand, to wit, a properly equipped drying room, heating apparatus for same and a pony and cart. Current indications are that the motor-car trailer suggested as an alternative to the pony cart can be definitely ruled out. From the instructions which are given for the fitting up of the drying shed, assumed to be an existing structure converted

to the purpose, it is obvious that much saving of expense will depend on the handiness of the worker and on the second-handedness of the materials used. The actual drying is the most important operation from the amateur collector's point of view and upon it depends the successful production of a marketable article. Much attention is paid to the process in these pages. Some useful hints are provided on collection and harvesting. The book concludes with brief, illustrated descriptions of the various herbs likely to be marketable, the information including habitat, use, the part of the plant to be collected and other helpful information. That there are difficulties to be faced in wild herb gathering is not in doubt, that they can be overcome by care and common sense is plain, and, since the publishers of the book are well-known London wholesale botanical drug importers, it seems certain that a market for the products is not very far away.



710. SCHARRER, K. 631.811.9  
*Biochemie der Spurenelemente. (Biochemistry of trace elements.)*  
 Paul Parey, Berlin, 1941, pp. viii + 272, R.M. 26

This book is in the main a review of work on the relation of thirty-three elements to the physiology of plants. It concerns itself strictly with the trace elements, all the elements of classical studies of plant nutrition being omitted as well as those others, such as sodium and silicon, occurring in considerable quantity in plant material. The occurrence of the elements in rocks, soils and animal tissues and their roles in animal physiology are also touched upon. A chapter is allotted to each element, the amount of text varying from half a page for zirconium to fifty-five for boron. The very heterogeneous literature has, in general, been efficiently digested, though occasionally one finds passages which appear to be rather out of context. The author usually confines himself to an objective statement of the results obtained and expresses his opinion on the importance of an investigation simply by the space allotted to it. One could wish for a rather more critical approach, and in particular more information as to the methods used. As well as dealing fully with British and American work, the book gives accounts of many European investigations not generally known in this country. If it is compared with Willis's "Bibliography of the Minor Elements", one finds that the overlap between the two is no more than about 50%; in the case of aluminium, molybdenum and zinc to take three elements at random, 60%, 50% and 30% respectively of the references given by Scharrer are not mentioned by Willis. Conversely, many of Willis's references are not given by Scharrer. About 2,000 papers in all are mentioned; the references are given in separate lists for each chapter, and are arranged in the order in which they are mentioned in the text. This arrangement makes it difficult to look up a given paper and leads to a certain amount of duplication. The book is well printed and produced. After the war, it will find a deserved place on the shelves of all botanical, agricultural and horticultural libraries.

D.W.G.

711. D.S.I.R. LONDON. 016: 664.85 + 664.84  
*Index to the literature of food investigation.*  
 1941, Vol. 13, No. 2, pp. 79-155, 4s. 6d.

This valuable publication includes 18 pages containing 118 abstracts of articles dealing with fruit and vegetable preservation.

712. JOHN INNES. 634/635  
*Thirty-second Annual Report John Innes Horticultural Institution for the year 1941, 1942, pp. 14.*

The report of the Pomology Department briefly notes results of work on the following subjects:—Fertility and parthenocarp in pears, plums and cucumbers; polyploidy in cherries and mulberries; time of flowering in pears; pollen tube growth in *Prunus avium*, *Primula obconica* and other plants; autotetraploids in tomato. The Genetics Department has worked on *Phaseolus* spp., *Pisum*, *Primula sinensis*, tomato and maize. It is noted that John Innes hybrid sweet corn is now being marketed and fresh supplies of seed are to be raised this season. Trial crops have been very successful. In the Cytology Department a series of parallel experiments have been carried out on root tips of *Trillium*, *Allium* and *Vicia* X-rayed at various temperatures. Results are discussed.

713. MOHRING, H. K. 635.1/7 + 635.9  
*XX. Tätigkeitsbericht der gärtnerischen Versuchsanstalt Friesdorf-Bad Godesberg 1939-40. (20th report of the activities of the Friesdorf-Bad Godesberg horticultural research station 1939-40.)*  
 pp. 40, from abstract *Forschungsdienst*, 1941, Vol. 11, abstr. p. 100.

Various trials are noted on different pot plants and vegetables, e.g. tomato, bush bean, etc., on the control of

red spider and on the use of pyrethrum and derris preparations.

714. MAINE. 633  
*Report of progress for year ending June 30, 1939 of the Maine Agricultural Experiment Station. Bull. Me agric. Exp. Stat. 397, 1939, pp. 695-846, forming part of the 55th Annual Report.*

Ten pages are devoted to apple growing problems, 40 to potatoes, 4 to small fruits.

715. S.S. AND F.M.S. DEPARTMENT OF AGRICULTURE. 634.774  
*Quarterly report of the Malayan pineapple canning industry, June to August 1941.*

*Malay. agric. J.*, 1941, 29: 406-9.

Work at the Government Research Station and Canning Factory is reported. *Pineapple juice*. Cloudy, unfiltered pineapple juice is required by the market, but this, during processing, forms an unattractive sediment, chiefly when the juice is heated between 150° F. and 160° F. It is heavier and more copious from unripe than from ripe fruit. It was found that the sediment could be kept longer in suspension by passing the fresh juice through a centrifuge. Homogenizing the fresh juice also had the effect of keeping the sediment in suspension longer than for untreated juice. Sterilizing fresh pineapple juice by straining through muslin and then passing through a Seitz E.K. cold sterilizing filter at 22 lb. per square inch pressure straight into sterile bottles, which were then immediately closed with sterile crown corks without any heat treatment, produced a clear sparkling juice with true, fresh pineapple flavour. Pineapples are now peeled before being pressed for juice; any dark green skin left on gives a dark juice and unpleasant flavour. Careful blending of juice from fully ripe and underripe fruit and careful selection of pines can greatly improve flavour. The best flavoured juice was obtained by pressing unpeeled, fully ripe pines, but any trace of green peel will be detrimental. A recovery of 41.5% by weight was recorded for whole fruit against 27.1% for peeled fruit. Coarse chopping of fruit before pressing did not affect flavour but finer chop darkened the juice and worsened the flavour. *Jam*. Pineapple and papaya jams with lime and ginger flavourings were very successful. *Dried pineapple*. Sliced pineapples dried in an improvised tunnel drier, if previously soaked overnight in a solution of 1% sulphur dioxide to prevent spotting and improve colour, could be made to resemble canned pineapple in flavour and appearance when required for the table by boiling with sugar for 20-30 minutes. Pineapples so dried represented a saving of 600% shipping space over those canned in the usual 1½ lb. tall cans. In the tropics dried pine slices must be stored in air-tight containers. *Vacuum syruping process*. This process, tried for the first time in Malaya, greatly improved colour and appearance over any process yet tested, giving the fruit a translucent appearance and eliminating the white markings common in canned pineapple. The method is briefly described. *Chemically preserved pineapple*. Preservation with sodium bisulphite is cheaper than with sodium benzoate, but with the former cooking is necessary before consumption to remove the sulphur dioxide flavour. As regards the crop as a whole there was general over-production and much of the fruit was unharvested.

716. RUBBER RESEARCH INSTITUTE OF MALAYA. 633.912  
*Abridged Annual Report of the Rubber Research Institute, 1940, 1941, pp. 19.*

Further experiments of the use of growth substances with budded stumps confirmed the findings of the 1939 report (H.A., 11: 1043). Slightly more failures were obtained when manure was placed in the planting holes than when it was applied 3-6 months after planting. Growth substances



appeared to stimulate early growth in germinated *Hevea* seedlings. Vigorous or high-yielding stocks did not improve the growth or yield of buddings, but vigorous scions often had a positive effect on growth of stocks. Yield of latex from tapping stocks below high buddings was positively related to vigour of growth and yield of the scion clone. In nutritional pot experiments the effect of phosphorus deficiency is amply demonstrated. The omission of calcium from a complete nutrient solution resulted in rather better growth. The planting of budded stumps compared with seedlings budded in the field show that the advantage in development of budded stumps is only 3 months, much less than is often claimed. The progress of certain experiments recently laid down is mentioned and there are brief reports of their work from the various technical departments.

717. ANON. (MAURITIUS). 633.61  
Comptes rendus des conférences organisées par l'Association des Anciens Étudiants du Collège d'Agriculture. (Proceedings of the Association of former students of the Mauritius College of Agriculture.)

*Rev. agric. Maurice*, 1941, 20: 193-256.

An interesting collection of papers on problems connected with sugarcane. Methods whereby the island of Mauritius could be rendered more self-supporting by increasing the production of vegetable foods are also discussed.

718. MAURITIUS, CHAMBER OF AGRICULTURE. 633/635: 658.8

Rapport du Président sur les travaux de l'exercice. 1940-41. (President's report on the work of the Chamber of Agriculture, Mauritius, for the year 1940-41.)

*Rev. agric. Maurice*, 1941, 20: 308-16.

The report gives a good idea of the agricultural position in Mauritius from the commercial standpoint.

719. PENNSYLVANIA. 634/635

Science for the farmer.

54th Annual Report Pennsylvania Agricultural Experiment Station for 1940-41, 1941, pp. 63.

Work of interest to horticulturists is discussed in the following sections:—Floriculture pp. 19-21, Vegetable growing pp. 49-56 and Orchardling pp. 30-37. Apple orchard cultivation is found to increase water loss. On the other hand sod growth in an orchard 3 or 4 years old seriously checked growth. Peach soil erosion was controlled by the proper use of sod cover crops. Potash shortage was found to limit peach tree growth. Malling XII has proved a good stock for Stayman apples, whereas Malling XIII has not done so well under Pennsylvania conditions. Malling IX is too dwarfing but Malling II shows promise as a dwarfing stock. For cherries mazzards are proving successful. Success was achieved with the aid of indolebutyric acid in rooting cuttings of some mahaleb cherries but not of other mahalebs, Stayman or Northern Spy apples or mazzards. Insecticidal and fungicidal sprays are discussed.

720. SOUTH AFRICA, DEPARTMENT OF AGRICULTURE (VILJOEN, P. R.). 63

Annual Report of the Secretary for Agriculture and Forestry for the year ended August 1941.

*Fmg S. Afr.*, 1941, 16: 403-29.

A general survey of the present conditions of agriculture in the Union of S. Africa and the reactions to war conditions. The reports of Divisions are this year to be published separately in a joint bulletin which will be sent to subscribers to *Farming in South Africa*.

721. TUCUMAN. 633/635

Memoria anual del año 1940. (Annual report of the Tucuman (Argentine) Experiment Station.)

*Rev. industr. agric. Tucuman*, 1941, 31: 5-106.

The report gives a full account of the activities of the Tucuman Experiment Station for 1940. Some notes of horticultural interest are here abstracted pp. 27-47 (E. F. Schultz). The need for growers, in view of competition from neighbouring countries, to grow only a few selected varieties of citrus is stressed. Those recommended are—*oranges*: Ruby Blood, Mediterranean Sweet, Jaffa, Lue Gim Gong, Valencia Late; *mandarins*: Common selected; *lemons*: Genoa; *grapefruit*: Marsh Seedless. Choice between Lue Gim Gong and Valencia is optional. The Station has hitherto recommended Lue Gim Gong, but it differs little from Valencia Late in yield or quality. The latter has now been put back in the list owing to the insistence of many growers to whom it is more familiar. Oranges Hamlin and Parson Brown are suggested as being the best of the extra early varieties to market from 1 May onwards. There is a good commercial opening for these. In the rootstock trials (1934) sour orange still maintains its superiority, with Rangpur lime second. The scions on the other stock varieties on trial are growing normally with the exception of those on trifoliolate. Ruby Blood alone seems to fruit well on this stock and even so there are signs in some trees that stock/scion union is not complete. Ruby Blood on sour orange was planted out in 1937 with the collar at various depths on non-irrigated ground. Exanthema developed in all plantings except those at 30 cm. below ground level (15 cm. above, 20%; 10 cm. above, 25%; ground level, 13.3%; 10 cm. below, 12.05%; 20 cm. below, 0.7%; 30 cm. below, nil). The lowest plantings also gave the highest yields. The experiment is to be repeated under irrigation. It is anticipated that the result may be quite different. *Soybeans*. Interest in soybean is reviving in view of the increase in value under war conditions. There are said to be over 15,000 varieties. Trials have been carried out with a selected few and are briefly reported. *Cover crops*. As a green manure to grow under citrus the bean known as "poroto ceniza" has outstanding qualities for vigour, resistance to beetle and ability to quell Bermuda grass and other weeds. Other cover crops are discussed. *Alewives fordii*. Tung trees are very resistant to frost provided it is not a late one and they are quite dormant, in fact a certain amount of frost seems necessary to keep them in health. The trees at Tucuman have now been established long enough for the high yielders to be determined for propagations.

722. A.H. 63: 371.2/3

Higher school of Agriculture at Wageningen.

*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1941, 32: 399T-403T.

This is a brief, useful outline of a study published by Professors G. Minderhout, J. A. Sprenger, J. E. van der Stock and A. Te Wechel on the organization of the Landbouwhoogeschool, Wageningen, qualifications for entry, courses of instruction and scientific research. Further details as to exact title, publisher, etc. of the original are not given.

- 723.

The following annual reports have also been examined:—

A.R. Dep. Agric. Fiji for 1940 (JACK, H. W.).

*Agric. J. Fiji*, 1941, 12: 94-9.

*Report on the fermentations industries for 1941*. (Society of Chemical Industry and the Institute of Brewing), 1942, pp. 21, bibl. 85.

A.R. Supt. bot. For. Dep. Hong Kong for 1940-41, 1941, pp. 5, 30 cents.



